WE, THE AMERICAN PEOPLE,
guided in the past 176 years by the great and
universal truths of our Declaration of Independence,
have built for ourselves,
within its framework of freedom and opportunity,
a great Nation...
with the highest standard of living in world history.

And yet today,
more than ever since July 4th, 1776,
we must make still another declaration...

A Declaration of Dependence

WE, THE AMERICAN PEOPLE,
assert ourselves to be a Brotherhood,
the All-for-America team.

Men and women of all races and all creeds
working together, laughing together
...and even dying together.

Men and women of all creeds and all races
needing each other and depending on each other...

Depending upon every American
never to put his personal gain,
or that of his business,
or that of his labor organization,
or that of his constituents,
ahead of the welfare of our people as a whole...

Depending upon an abiding faith
that free men, with a resolute will to remain free,
can out-think, out-build
and, when necessary, out-fight
any who try to destroy that Freedom...

Depending upon free nations,
united in the common good of all mankind,
to preserve peace in a troubled world...

Depending upon free speech and a free press,
upon an enlightened rather than a frightened people
...and upon armed preparedness
only while the 'live and let live' alternative
is forbidden us...

And, always, depending upon prayer,
and reverently upon God,
to guide us in the right.

For only by declaring this Dependence,
can we hold fast to our Freedom,
our way of life...and our Independence.

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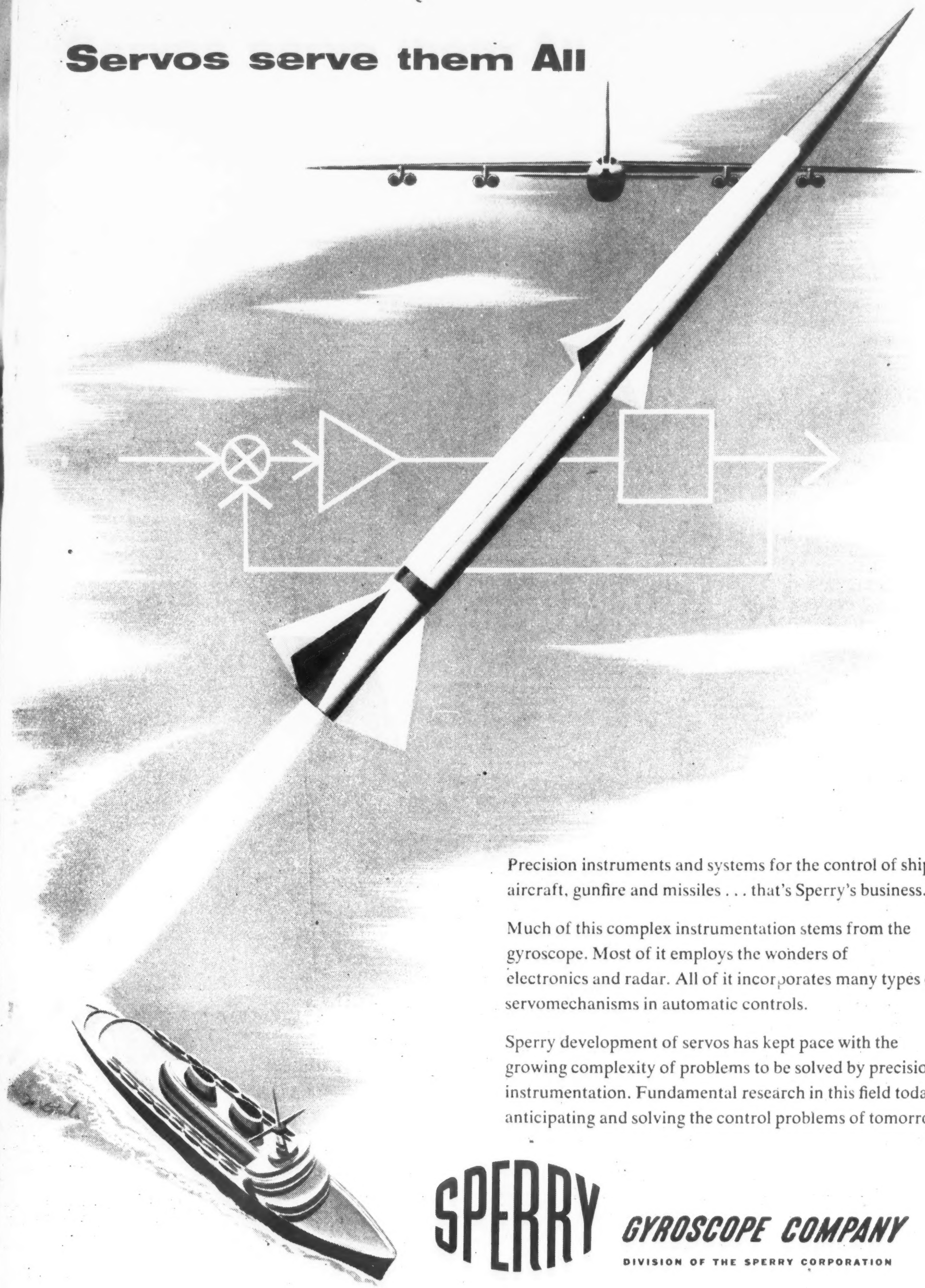
Servos serve them All



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Communications-Electronics-Photography

Journal of the Armed Forces Communications Association

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Newly appointed Defense Mobilizer

Henry H. Fowler

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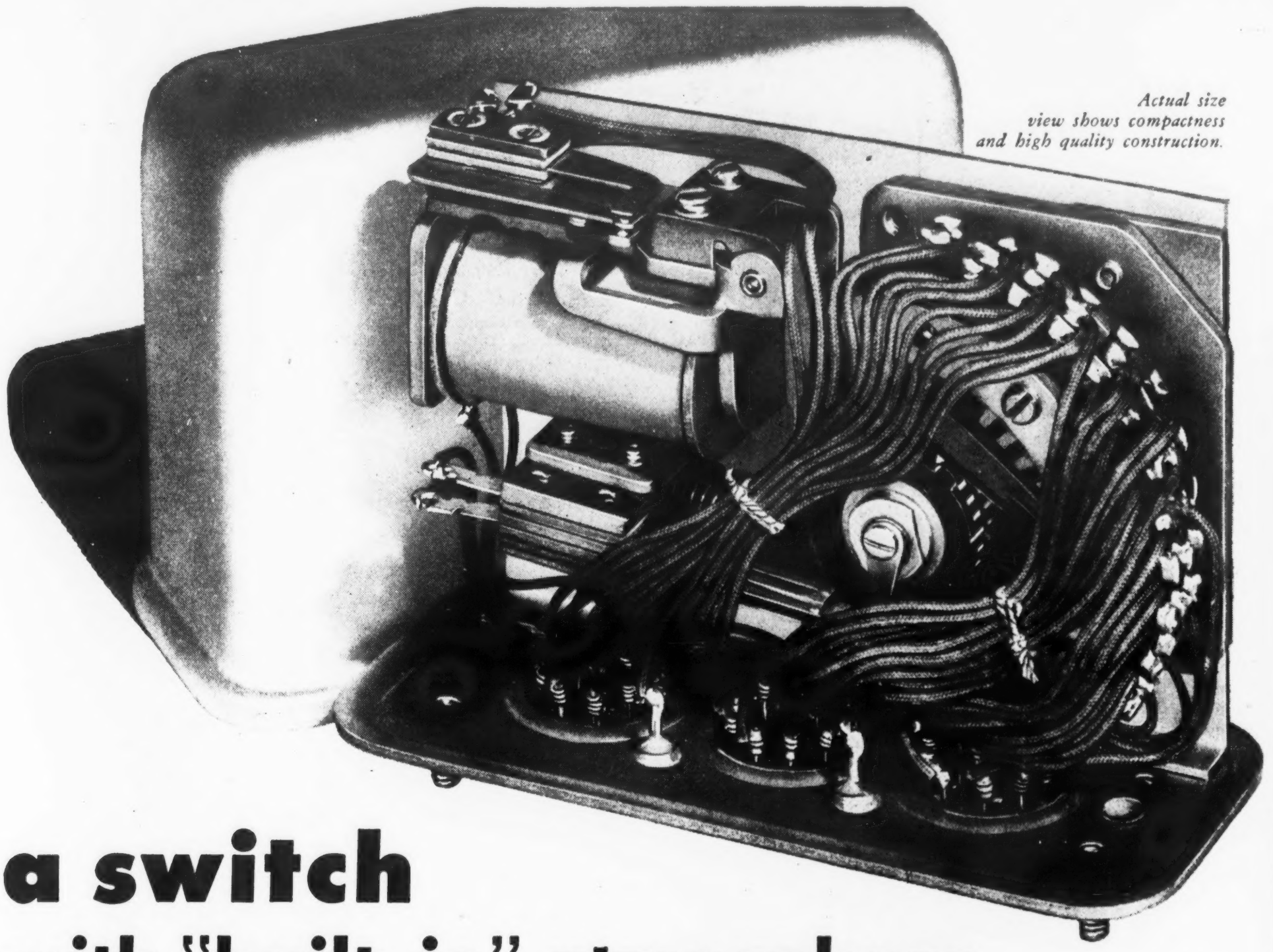

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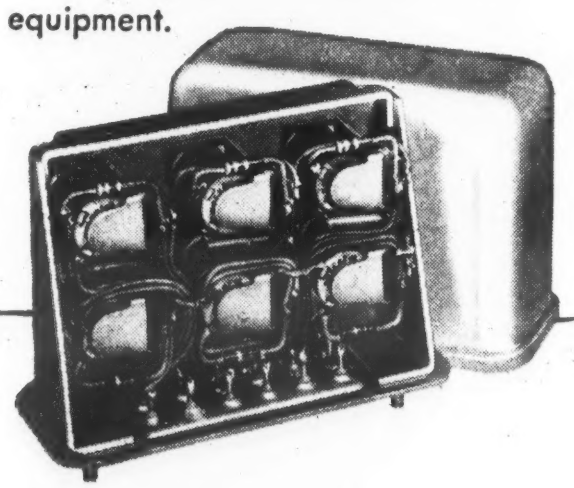

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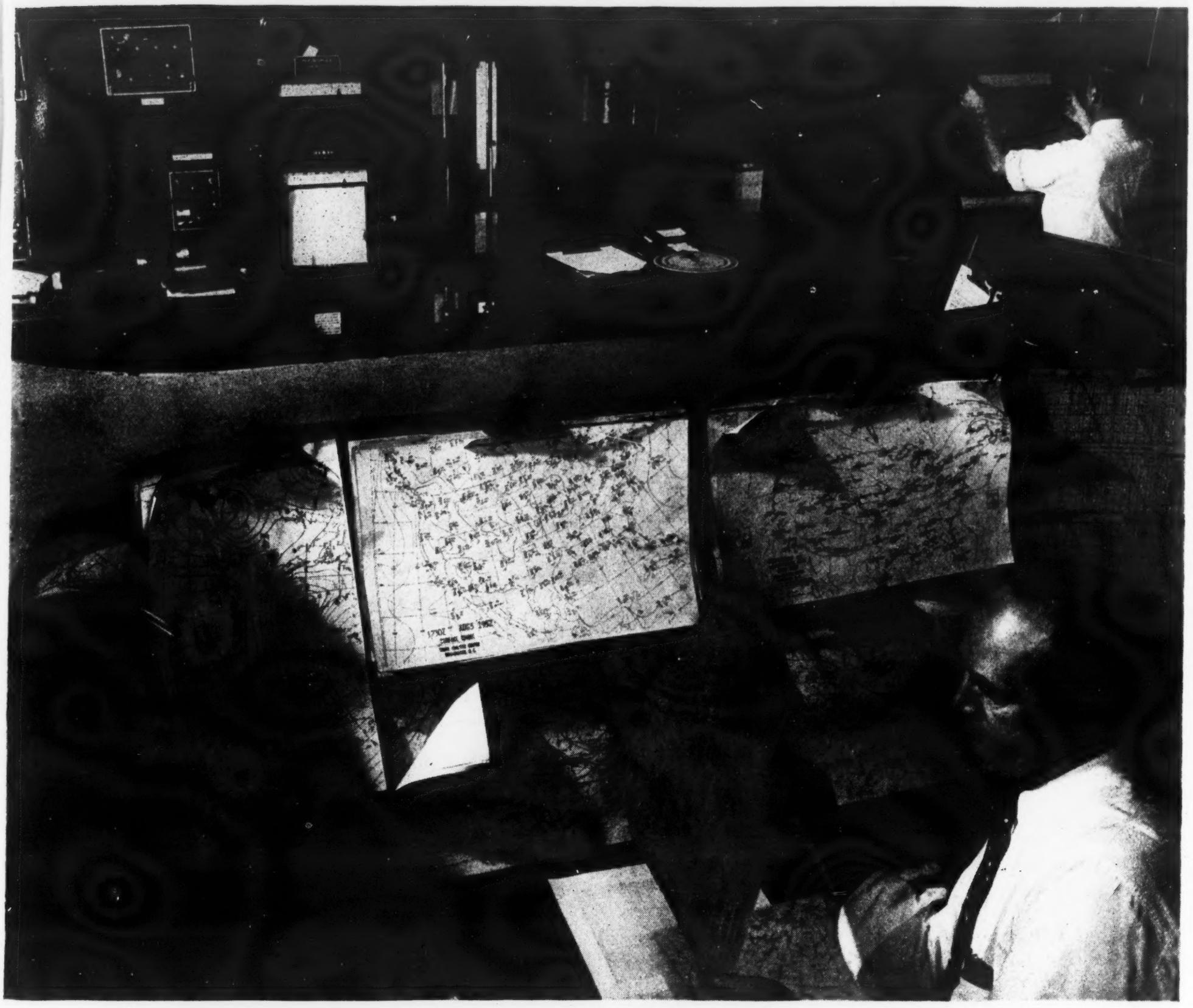

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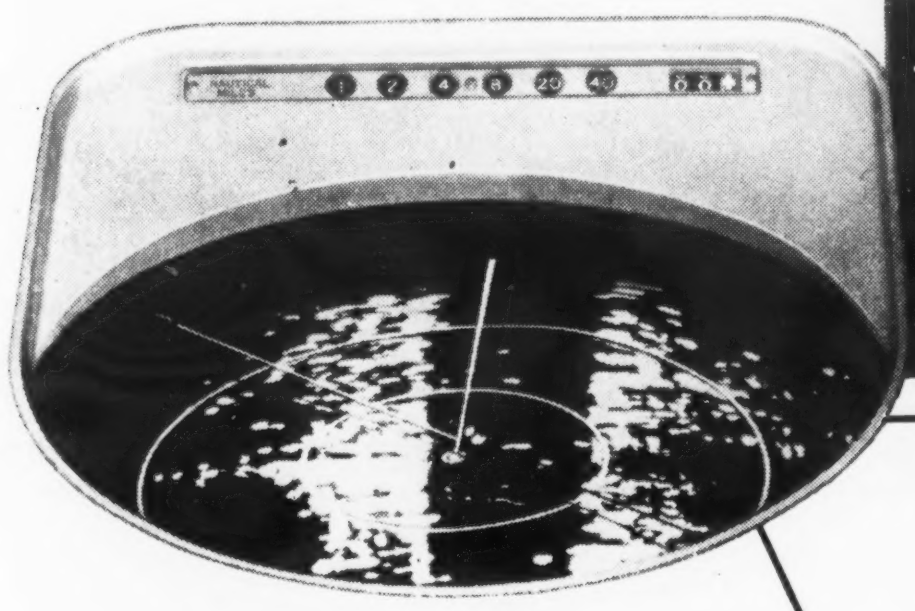

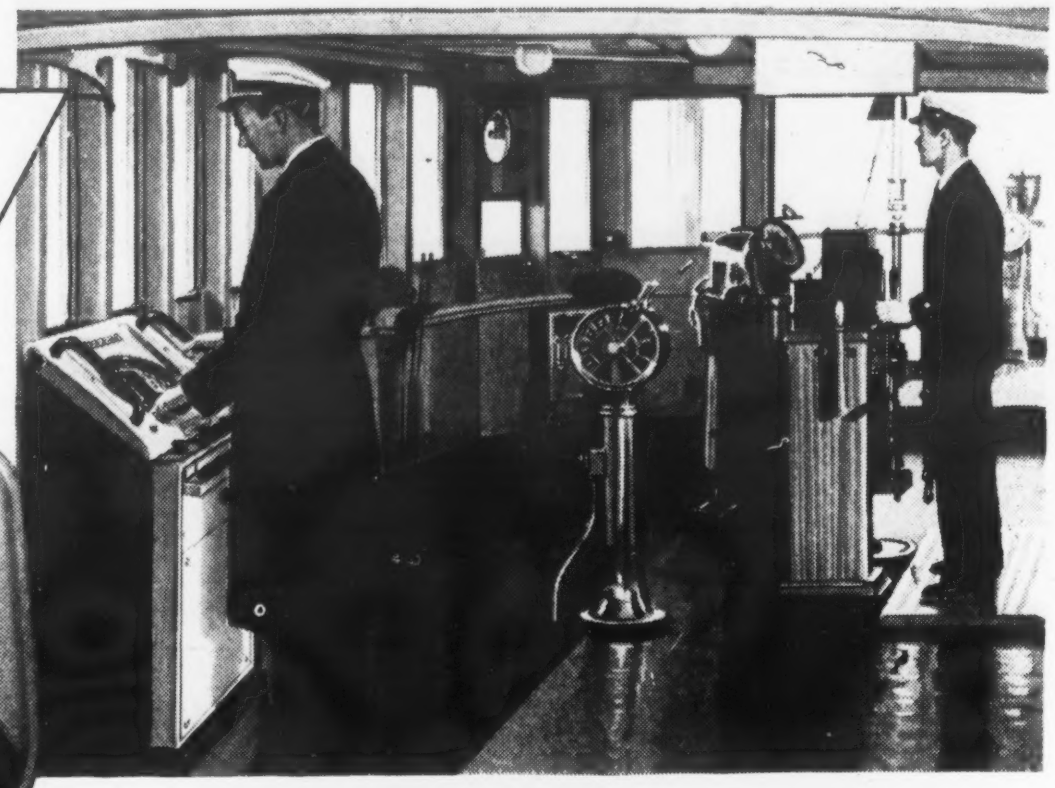

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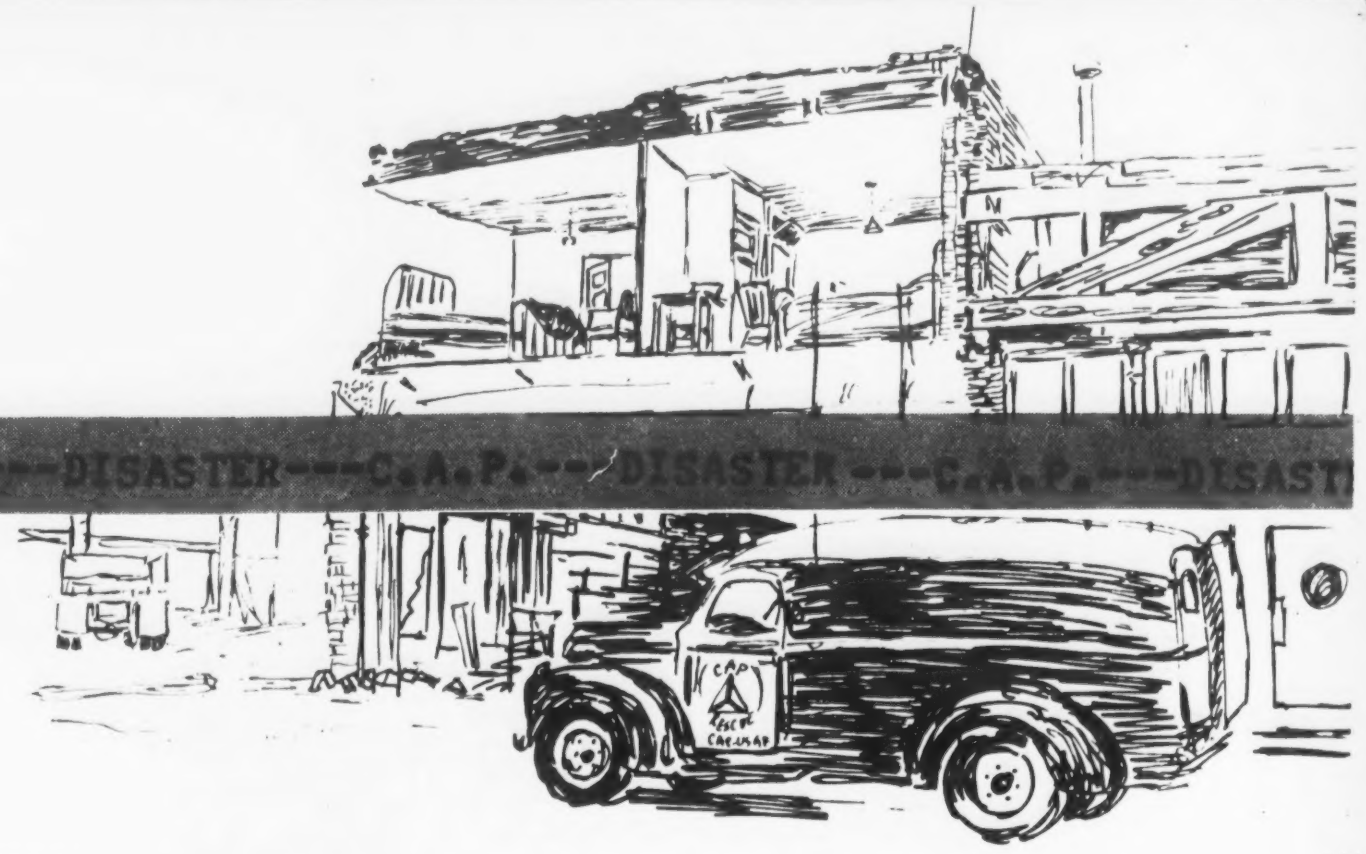
Civil Air Patrol Mobile Communications Units in Action



Major Louis Ashlock, CAP
and
A/IC Jesse Nesbitt

In the grey dawn of July 21, the sleepy, little town of Tehachapi, California, in the mountains which separate Northern and Southern California suddenly became a scene of death, destruction and utter terror.

The earth heaved, buildings toppled, communications were cut to the entire outside world. Flames broke out in the rubble that minutes before had been a town of 1,500 sleeping persons.

At 6:00 a.m., Major Russel Bankson, communications director of the California Wing, CAP, and Captain William Husbands, special operations communications officer, were each on their way to their daily jobs, one at the Alameda Naval Air Station and the other at the Navy's Treasure Island base. Each had heard the urgent call of a radio ham on the radio sets in their cars.

Within an hour CAP was on its way to the rescue and to help the stricken community. Deputy Wing at Los Angeles was asked to develop a standby network, which was in operation by 10:00 a.m. Preliminary traffic was on the air an hour later. By 1:00 p.m. the first mobile units were arriving at Tehachapi and a secondary network was established to give relief to the overworked initial network. By 4:00 p.m. an airplane had arrived with a portable radio for ground use. For 40 hours the radio network handled communication from the stricken community. Newspapers used it to transmit information to the outside world; it handled all Red Cross, Navy and other official messages; it transmitted scores of welfare messages; and for the Red Cross it inaugurated a "phone patch" service so that directors in San Francisco could talk directly to supervisors on the scene.

In addition CAP flew in six doctors and nurses to aid the injured and placed another plane at the disposal of the Red Cross director to fly him wherever his duties called. At the end of the 40 hour emergency, three residents of the area, who had worked continually in the relief work of digging out the rubble, were flown by CAP plane to San Diego, where they had business appointments.

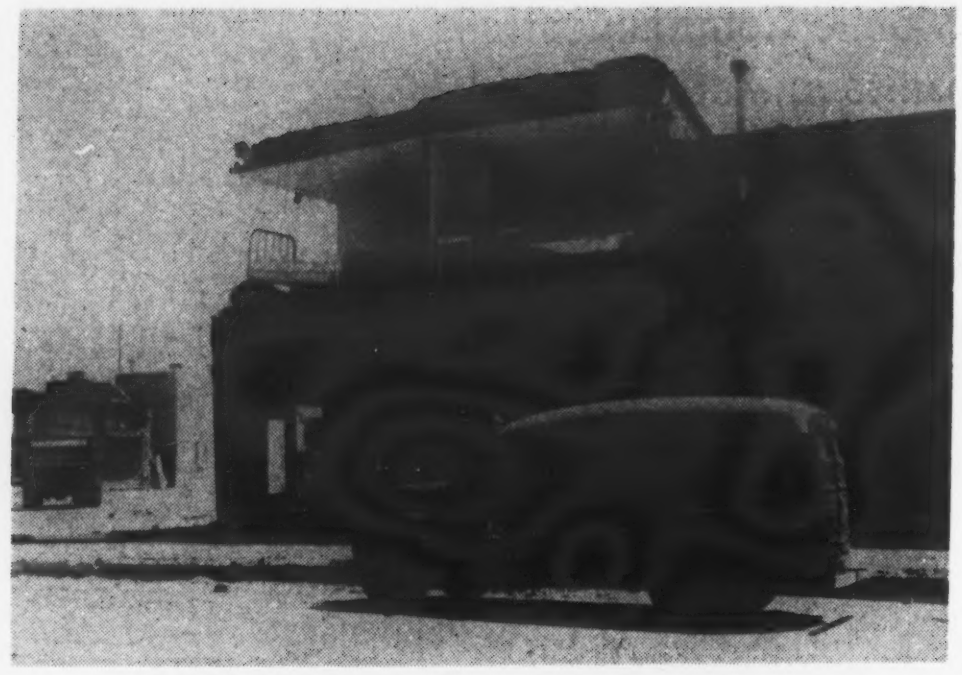
In all, 17 radio units, eight base installations and nine mobile units, were in use. More than 100 members of CAP were actively engaged in helping to restore order and to bring relief to an area hit by one of the worst earthquakes in the history of the country.

"This unfortunate disaster proves the worth of CAP to the nation" said Colonel Howard Freeman, commanding the California Wing. "When emergency called, the training and organization which has gone into CAP in California came through with flying colors to bring comfort to a people who had been struck by tragedy. Each member of CAP who responded so selflessly in this emergency is deserving of the highest commendation."

If a disaster of any type should strike a city in the United States, CAP radio operators would be on the job in a matter of a few minutes, sending out the necessary calls to other cities and states. Just recently two CAP operators were in North Carolina operating their radio sets. One of the operators heard a distress signal, picked it up and passed it along to his radio pal. He, in turn, contacted other CAP operators in the vicinity of the disaster report. Just fifteen minutes after Mrs. T. C. Wood, of Gaffney, South Carolina sent out a

On a recent tour of Shreveport, Louisiana Municipal Airport, two cadets of the Mansfield, La. Squadron observed communications operations. Tours are made monthly as part of their preflight training.

The above radio operator is standing watch at the CAP radio net station during a search. Each subbase in the search was in direct radio communication with the mission control base.



At the recent earthquake which struck Tehachapi, Calif., CAP members and equipment were on the job to help those in distress.

distress signal from her burning home, CAP operators guided fire department aid to the scene. This is only another example of how fast and efficiently the network can act in an emergency.

Still another example of how CAP's communications works is the more recent near-tragedy that occurred at Sebewaing, Michigan. A soldier veteran of Korea home on leave and two civilian buddies were saved from drowning after their rowboat had overturned on the lake there, through the quick thinking of CAP cadets, senior members, and the use of communications. Cadet Lt. Dusty Suit, Bad Axe Squadron, was on the plane parking line, close to the lake shore, when he heard the cries for help. He immediately contacted Cadets Donald Nye and Daniel Kilbreath, of Imlay City, who were on duty at the message center of the airport. They reported the distress call to Major Carl Nye, Commander of the CAP Michigan Thumb Group, who in turn enlisted the aid of two pilots dining in the airport cafeteria. With the aid of pilots Frank Hofmeister and Howard Yackle, a seaplane was taxied out to the drowning men.

It was only a few minutes from the time the first distress signal was heard until the actual rescue was effected, thanks to CAP communications.

The Communications System is part of the vast CAP organization, a civilian corporation. National Headquarters of CAP is located at Bolling AFB and is manned by an all—military force. Commanded by Major General Lucal V. Beau, USAF, CAP National Commander, the headquarters aids the corporation in carrying out its mission as auxiliary of the USAF.

Civil Air Patrol, boasts a communications system of 1,494 fixed stations and 7,823 mobile units for a total of 9,317 stations throughout the U.S. and territories.

All CAP operators are officers, senior members, and NCO's in the organization. They are required to have an FCC license in order to operate in the Communications networks. At this writing there are 6,028 CAP radio operators ready to answer the call of any emergency.

CAP's mobile communications have proven an invaluable aid in emergencies, such as the Mid-West Flood disaster this year and the Mississippi Ice Storm a year ago.

Each time a call for help is issued, the machinery of CAP goes into motion. Employing the use of CAP pilots, observers, first aid crews, sometimes dog sleds, ski teams, boats, cars and trucks and always communications, they go into action.

Almost every known type of power supply is employed in CAP radio communications. Among these are the vibrator, battery packs, dynamotor supplies and a.c. rectifier units. The voltage output on these supplies ranges from 90 volts from the battery pack to as much as 3000 volts from

During a recent search-and-rescue mission in western Ohio, units such as this were used to relay messages from Headquarters.

Radio communications set-up at Civil Defense State Headquarters of Rhode Island. This is the official station for air to ground communications for the Rhode Island State Council of Civil Defense.

Cadets of the Fairfax (Va.) CAP Squadron testing communications equipment in preparation for a practice search and rescue mission. This squadron was successful in locating the wreakage of a B-26 missing from Langley Field on March 19th.

CAP members man controls during "Operation Flood." Other phases of the role played by the Civil Air Patrol in event of an emergency are depicted in the U. S. Air Force public information film, "Civil Air Patrol."

the rectifier type supply. This, of course, depends on its application and the equipment with which it is used.

The most popular of the transmitters being used in CAP as net control stations is the BC-610 transmitter. It is capable of providing both voice and telegraphic communications in the 500 watt class. The same type transmitters were used by the military services during World War II.

Many different types of transmitters and receivers are used by the Communications men. They are "homemade," surplus military equipment and commercial type. Among the equipments being used are the National NC-173, NC-183, NC-125, and NC-57; and Hallicrafters S38B, S40B, SX-71, SX-22, SX-28 and S-72.

With the equipment and the manpower to handle it, CAP can be found in action in any part of the U.S. or its territories where the need exists. Their services are not limited to answering calls for help in major disasters, for they handle isolated cases as well.

In all search and rescue missions, which are ordered by the Air Force's Air Rescue Service, CAP employs the use of communications. A pilot may discover the lost plane and crew in some isolated area where landing is impossible for "puddle-jumpers." He radios the position of the lost aircraft to a ground crew, who in turn relays the information to a ground rescue team. The CAP members on the ground move in to rescue the pilot and administer medical or other aid, keeping in touch with other CAP members at the same time through the mobile communications.

This noteworthy network, that has aided so many in the past, is modeled along the same lines as a regular Air Force organization. National Headquarters station is VPO, which serves as net control station in scheduling operation with its eight regional net stations. Each regional area of CAP has a regional radio communications headquarters, which serves as net control station for the CAP Wings in its command. The Wing net and lower echelon stations follow a like pattern. These are all fixed stations with mobile back-up capabilities.

Operating on an independent basis, or as the CAP commander has directed, the mobile stations are never rendered lifeless due to fixed communications failures. This single fact has boosted the mobile system to the top of the communications bracket in CAP. They can operate from anywhere, at anytime, under any conditions.

All this would not be possible if it were not for the radio operators who leave their desks, machines, shops and homes at the call of CAP to participate in missions. They operate these units that have aided greatly in past emergencies in this country and their only compensation for their labor and time is knowing they have accomplished a "job well done."

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A 148-14 mc Portable Mobile Transceiver used for plane to plane, plane to ground communications, or as a general mobile unit is demonstrated to members of the Camden, N. J. Squadron.

The Flight Rescue Unit in New Hampshire has a four-wheel drive Jeep truck with snow plow, dog sled team, first aid kit, portable radio and pogo sticks.

Recently appointed Defense Mobilization H

The protection of America and the American way of life, in a world beset by international tensions and immediate threats to the security of the free world, is clearly the most important operation upon which we Americans can be embarked today. Integral to this operation, and of special interest to the members of the Armed Forces Communications Association, are what might be called the four major technological revolutions of our time. I refer to the epic discoveries in the fields of atomic energy, jet propulsion, electronics, and petro-chemicals.

Each of these vast changes is intimately related to the basic armament programs upon which our security depends. But it is not enough merely to recognize this fact; it is not enough to be in the forefront of scientific development and application. We must ride the forward wave of each of these four revolutions, perfecting the most advanced and most imaginative instruments for the protection of all that we cherish as a nation.

Hand in hand with technics of the laboratory and the production line, there goes another kind of instrument. That is the structure, or the organization, of government-industry-labor joint operation necessary to make our peacetime defense mobilization work. This mobilization effort *is* working, and, I think, moving forward on an imaginative basis. We developed a new concept, shortly after the outbreak of the war in Korea. The plan was conceived, and implemented by the Congress of the United States, that we should immediately rebuild our armed strength, and carry forward an intensive three-year program that would bring us to what we are calling the "plateau of armed readiness"—that state of security which we consider minimal in a most dangerous world.

At the same time, we were not to neglect the civilian economy. It must be maintained in a strong and healthy state as the foundation for national strength.

This was, as much as anything, because of the long-pull nature of the operation. The short-pull was—and is—the swift climb to the mobilization plateau, the period, perhaps, of greatest effort and of greatest shortages in vital materials. We are about half way through this phase. But the long-pull will be even more difficult. Having reached the mobilization plateau, we must have the toughness of mind and the endurance to maintain it for as long as necessary—perhaps many years. It is not to be expected that the international tensions which brought the entire mobilization program into being will relax in anything like the "near future."

We must also expand our industrial capacity and broaden the mobilization base to give us greater strength should total war be thrust upon us.

Under the powers conferred upon him by the Defense Production Act of 1950, the President created the Office of Defense Mobilization (ODM). On the production side was formed the Defense Production Administration (DPA). These bodies, together with certain special agencies created within existing executive departments, notably the National Production Authority (NPA) in the Department of Commerce, comprise the government organization of our defense effort. They are charged to carry out, in cooperation with industry and labor, the mandate of the Congress that the military and defense supporting industries obtain the materials they need to meet defense goals, and that the civilian economy receive its fair and proportionate share of the available supply—large and small business alike.

The phase of the program of particular interest to the AFCA—that dealing with communications and electronics—became the charge, in DPA, of the Electronics Production Board, and in NPA, of the Electronics Division. These two agencies work as a team with the Electronics Production Resources Agency in the Department of Defense.

I think that it can be said that in all fields, including the electronics field, the mandates of the Congress are being faithfully carried out.

Knotty problems in the electronics field have been largely resolved—the matter of spare parts, the matter of "lowest bidder" versus "lowest qualified bidder," the matter of crystals, the matter of spare parts manufacture

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Henry H. Fowler writes on—

DPA

ELECTRONICS and the Defense Mobilization Program

by NATO nations, matters of simplification, development of quality, the elimination of 'bugs" in production and performance, and so on.

Only recently an expansion program in electronics was set. It covered tubes, transformers, coils, capacitors, resistors, crystals, relays and other electrical components—new production facilities and equipment in the total sum of almost four hundred million dollars, to be completed by January 1954. To date, the march toward these goals has been made by industry itself, assisted by the government through the issuance of a number of certificates of necessity for accelerated tax amortization.

The allocation of scarce materials has been made possible through the Controlled Materials Plan (CMP). CMP should be visualized as a tested and effective method of insuring that the armed forces are able to meet their production schedules, and that what remains is distributed equitably, to maintain the normal civilian economy with the least possible disruption.

I will venture to say that CMP is as important to the defenses of America as are tanks, or a continental radar screen—or the atomic bomb itself—because if we had not had the system of which CMP is the visible machinery, we could not have superimposed a great weapons-building program upon the civilian economy without grave dislocations.

All in all, the defense mobilization machinery has worked well—in electronics, as in other areas; the result clearly of ingenuity and devotion and magnificent cooperation on the part of both industry and labor.

Yet I must issue a most serious warning. We are only halfway up the sharp incline to the mobilization plateau. We have not yet reached the plateau itself.

But already we are hearing cries of "Time for America to return to Business as Usual"!

I want to make it very clear that we cannot return to Business as Usual. For many years we must resolutely continue our work to keep America safe.

Government, industry and labor, in close cooperation, have worked wonders—but the work has only just begun.

Henry H. Fowler

They Brought 'em In —

AACS

By: Lee Shular

August 28 of this year was the commemoration of an unsung but vital American drama that was enacted seven years ago in Japan when the first American troops set foot on the sacred soil of that country at Atsugi Airfield, 18 miles from downtown Tokyo. While the whole world waited anxiously for news that was making history, a group of communications men diligently performed their assigned mission.

"Crash Project Number One" was the code name given to this prime mission. Success of the important history-making project goes to the members of the old 68th Army Airways Communications System (AACS) Group. These highly-skilled hand-picked operators and technicians who arrived two days before the 11th Airborne Division was scheduled to come in, set up the communications system that guided the occupation forces of General MacArthur to the Japanese homeland.

When news of Emperor Hirohito's acceptance of the terms of the Potsdam Ultimatum was received at General George C. Kenny's Far East Air Forces Headquarters, immediate plans were underway for "Crash Project Number One."

General Kenny contacted the commanding officer of the 7th AACS Wing, (Pacific area) Colonel Gordon A. Blake, (now Brigadier General) and outlined to him the communication requirements necessary for the first phase of the occupation of Japan. Colonel Blake informed the AACS operation headquarters located in Manila and stated what would be needed in the way of aircraft, communications equipment, and personnel to successfully carry out the mission.

Essentially, time was the foremost factor and all personnel worked 'round the clock readying the equipment for Z-Day (August 30, 1945). Twenty-four C-47s were acquired.

At Atsugi airfield, Colonel (now Brig. Gen.) Gordon A. Blake, Commanding Officer of the 7th AACS Wing, parks in front of the old Japanese operations building.

They were equipped with point-to-point transmitters, receiving stations, diesel power units, mobile control towers, fuel supplies, and rations. The C-47s took off from Nielson Field on an experimental flight to Clark Field. Here they landed and parked according to pre-arranged patterns.

The AACS crews practiced dry run tests after dry run tests until the procedures became automatic to them. They assembled the equipment, plugged in wires and cranked up power units. They rehearsed over and over until they were able to get the radio station operating in a flat 41 minutes.

The test run on Clark Field was chalked up as a success.

From here, the heavy-ladened planes took off for Okinawa to await the "go ahead" signal. At the Naha Strip, the AACS men rechecked their equipment, and here they received their final briefing.

The tense moment finally arrived. On August 28, at 2:30 a.m., (Japanese time) the initial eleven C-47s, led by Colonel Blake, took off from Okinawa.

When the C-47s let-down on the runway, the AACS men, most of them veterans of campaigns in New Guinea and the Philippines, lost no time unloading and setting up the communications equipment. Before the last plane touched-down, the pilots were receiving landing instructions from the AACS mobile control tower.

Less than an hour after the initial C-47s landed, operations went into full swing. Messages were transmitted to Okinawa; the air-to-ground and point-to-point stations were operating. AACS accomplished its mission and was back in business again.

As American and Japanese dignitaries greeted each other a few feet away, AACS men hammered and sawed as they converted the old Japanese operations building into the control tower that became the famous Image Control Tower at Atsugi. Strips of deflated Japanese life rafts were

nailed to the roof of the building to mark the tower. On the following day, the completed tower was ready to handle the heavy traffic that was due on Z-Day.

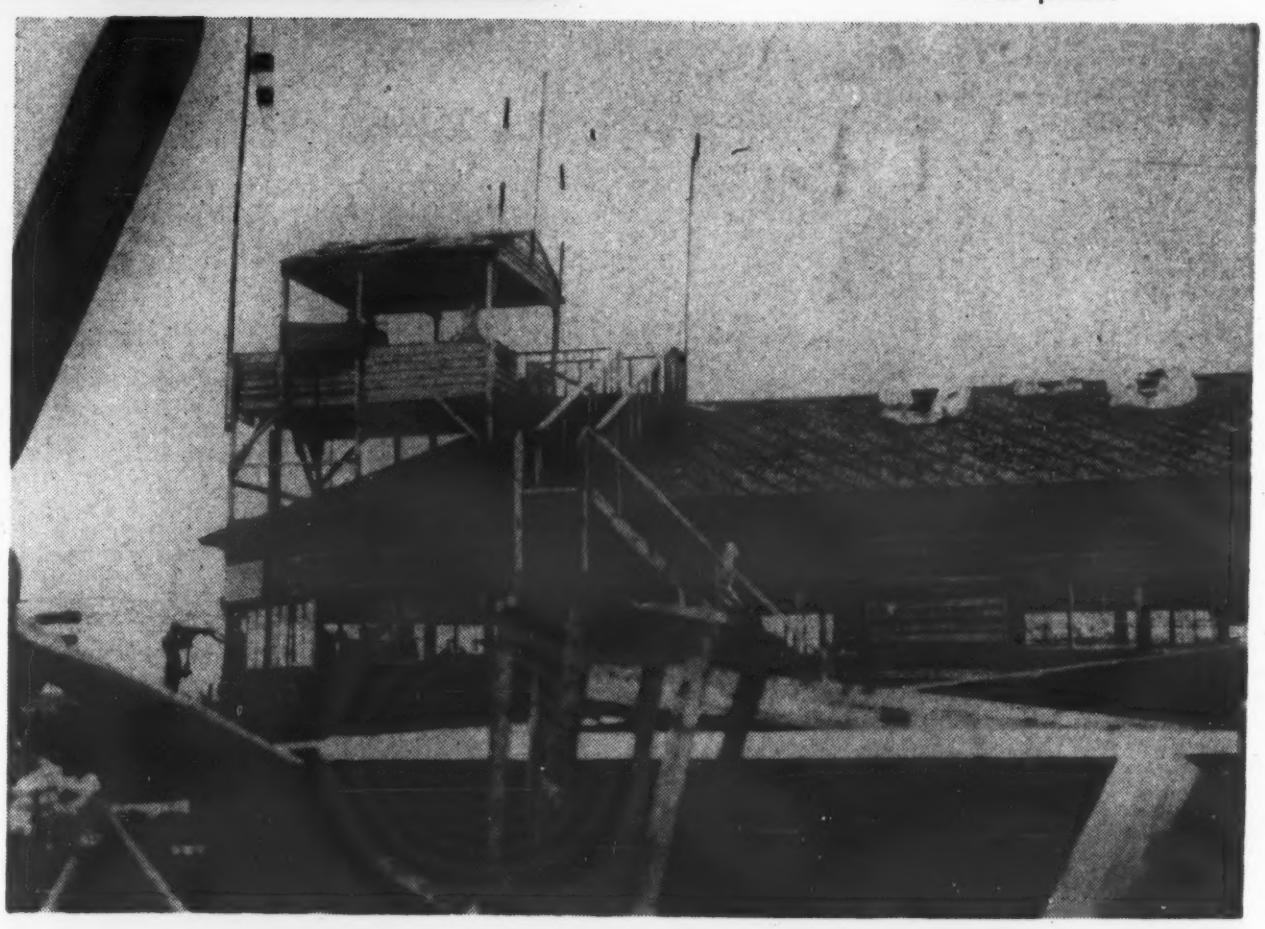
Atsugi Airfield buzzed with noise and excitement as the C-47s and C-54s roared in on Z-Day bringing in the high-ranking officers and the occupation troops. AACS control tower operators worked at top speed directing traffic; radio operators transmitted flight messages and weather data; cryptographers worked all hours of the day and night dispatching important messages. Teamwork was displayed by everyone.

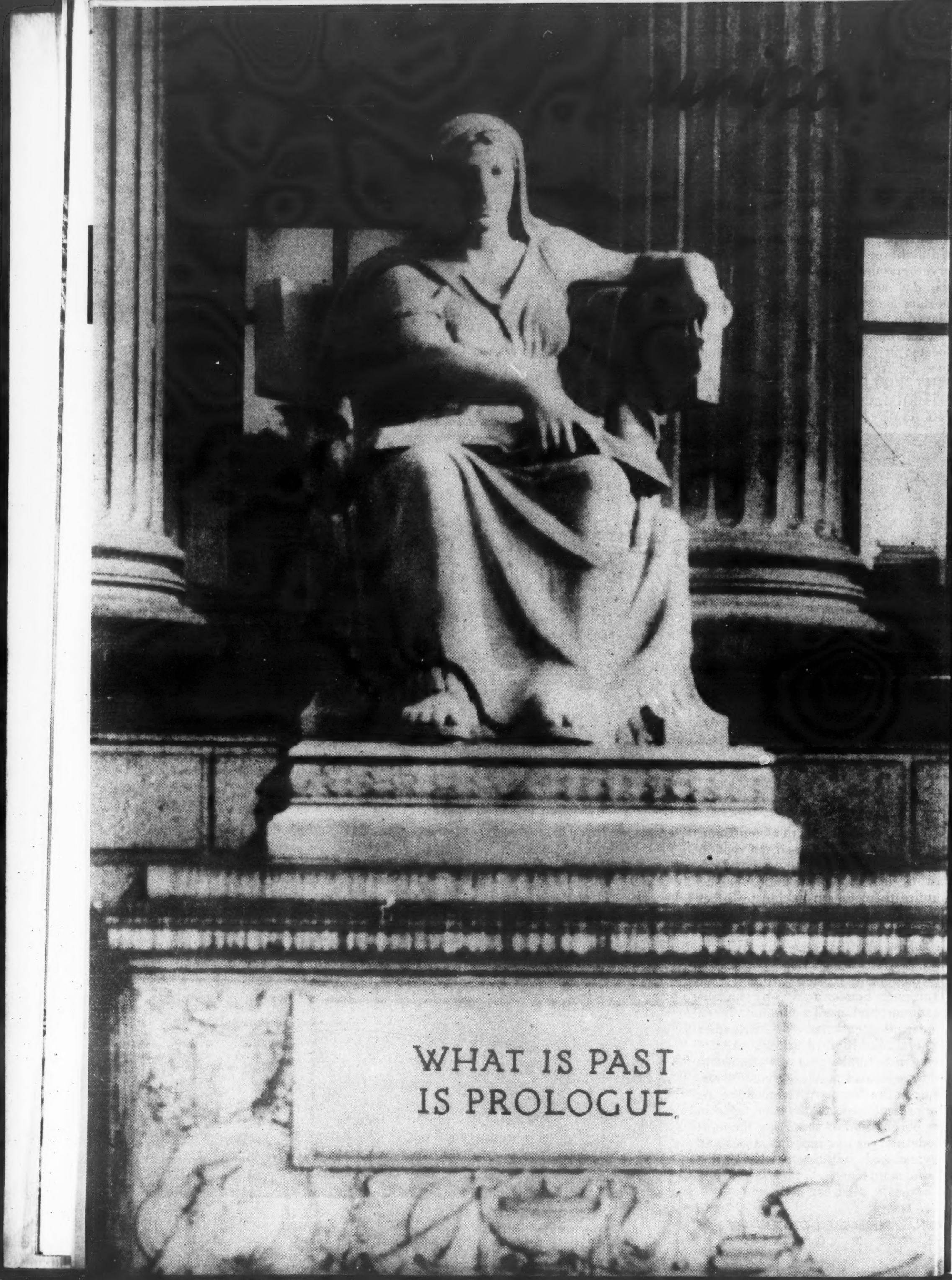
Back at the AACS headquarters, located in Asheville, N. C., came this message from Colonel Blake:
"HIT FIELD ONE HOUR PRIOR OTHER LANDINGS. ON AIR IN JIG TIME AND DELIVERING."

- Upper: Two AACS men add the finishing touches to the converted operations building as the control tower is readied to handle the heavy influx of aircraft carrying the American occupation troops into Japan on Z Day, August 30, 1945.
- Left: An AACS control tower operator in Image Tower gives landing instructions to incoming aircraft bringing in the 11th Airborne Division. The planes landed at the rate of two per minute all day long on Z-Day, unloaded their personnel and equipment, and were ready to be airborne in twenty minutes.
- Below: Image Tower was ready for "business" two days after the first American troops, members of the old 68th, AACS group set foot in Japan. Japanese deflated life rafts, which served as markers, were nailed to the roof of the old Japanese operations building. In the foreground is a dummy Japanese plane.

AACS men are a non-combatant outfit. They have gained the reputation of being the first to land and the last to leave. Often under enemy gunfire they remain behind to direct aircraft from the field, and to destroy the equipment before they leave.

Today, AACS known as Airways and Air Communications Service, is a component of the Military Air Transport Service (MATS) and is headquartered in Washington, D. C. Under the command of Brigadier General E. Blair Garland, AACS' personnel totals over 23 thousand and are located on more than 200 stations in the Northern Hemisphere. At the present time, AACS is engaged in the big mission of supplying the most modern types of communications and navigational facilities to the United Nations in Korea.




WHAT IS PAST
IS PROLOGUE

ets Its Sights AHEAD

By Harold Osborne

In the three-fourths of a century since the invention of the telephone, electrical communication has had a truly astonishing growth and development. In this country alone, there are not far short of 50 million telephones in service. The number of telephone conversations carried out among them each day is reaching toward the 200-million mark. The telephone has become an essential tool of all business and industry. Seventy percent of all the homes in the country are equipped with it. As more people have telephone service, more people need it and use it. It continues to become more and more an integral part of all aspects of the national life.

It is not possible, then, that electrical communication has become a mature art, in which we may expect future growth and modification but no extraordinary and transforming developments?

A prediction of this sort on a broader base was made in a report on "Industrial Depressions" published by the Commissioner of Labor in 1886, which presented the results of a careful economic study by representatives of the Federal Government. After pointing out that the necessary railroads had been built and that the economic tools in America and in West Europe had been brought fully up to date, he concludes, "It is true that the discovery of new processes of manufacture will undoubtedly continue . . . but this will not leave room for marked extension such as has been witnessed during the past fifty years or afford a remunerative employment for the vast amount of capital which has been created during that period. . . . There may be room for further intensive, but not extensive, development of industry in the present era of civilization."

Today we are less likely to make such a serious mistake. The whirlwind rate of development of new scientific knowledge and its application has given us the habit of expecting new marvels of rapid succession.

One of the reasons for the continuing growth and development of the telephone system is that telephone service continues to become a better bargain. It is cheaper in terms of hours of work. For example, the skilled workman who in 1940 has to work four hours to earn enough to pay his monthly telephone bill can pay it today with earnings of about two hours' work. As a result, more and more people feel that they cannot afford to be without telephone service in the home, and the extent of its use in business and industry is continually expanded. The indications are that this is a long-term trend, and will continue to stimulate the future development of the telephone system.

In addition to the economic trends, there are other technical and general trends of our national life which work toward the continued development of electrical communications, both in amount and in variety. In the long range, these general trends will have a great effect on the continued development of the telephone system.

a. The art of electrical communication continues to be developed rapidly.

b. Increased amounts and new kinds of communication service continue to be needed to meet the requirements of our rapidly developing social and industrial structure.

Development of the Art of Electrical Communication

The increase in the possibilities of electrical communication, due to the increase in technical knowledge and the development of new things, is rapid and extends through many fields.

The developemnt of the art comes about in part through the use of new materials, which are appearing with increasing frequency in this chemical age. For an example, consider the wonderful plastic *polyethylene*. While polyethylene has many uses in the telephone system, a striking illustration is its employment as a substitute for lead in the sheathing of telephone cables. This development alone made possible, right after the war, the rapid building up of manufacture of telephone cables to a level meeting the requirements of the Bell Telephone Companies: to a volume of 12 million miles of wire in cable in one year. With experience in its design, manufacture, and use, it is proving to have other advantages in many cases because of light weight and freedom from corrosion.

A quite different type of material fundamental to modern telephone systems is those ferrous alloys used to carry the magnetic field in myriad types of equipment. The Bell Telephone Laboratories over the years have developed new alloys of iron, nickel, and, in smaller quantities, molybdenum and other metals, which have extraordinarily improved magnetic properties. The bulk of certain types of loading coil, for example, has been reduced by 20 to 1 for the same use.

This is one illustration of a trend toward smaller and smaller volume in the development of modern communi-

The tiny plastic bead of the transistor contrasts with the famed "peanut" (6AK5) vacuum tube.

Reprinted from the BELL TELEPHONE MAGAZINE, Summer, 1952, with permission.

cation equipment. This also helps to hold down costs, both because smaller quantities of material are required and because of the smaller space required to house the millions of pieces of apparatus necessary in a modern automatic telephone exchange or toll office.

The new materials help to make practicable new types of devices which heretofore were impracticable. For example, the transitor, a great invention resulting from extensive scientific research, makes use of the metal geranium, which is not new to science but is relatively new to industry. In its present form, it consists of a tiny piece of this metal which has first been purified to an extremely high degree and then subjected to the introduction of carefully controlled impurities of different types and amounts. The tiny piece enclosed in the plastic bead shown in the photograph has three sections containing different types of impurity, and a wire connected to each of the three sections. This remarkable midget, connected with suitable circuits and modest sources of power, will amplify, modulate, or generate with extraordinary efficiency and economy the electrical currents required for communication. It seems destined to revolutionize a good deal of the construction and design of electronic devices.

New Systems of Communication

The processes of invention and development weld many of the new devices, along with many pieces of apparatus and devices previously available, into new methods and systems for giving communication service. The influence of these new communication systems on the development of telephone service is marked.

One of the striking modern developments is the great extension of multiplex systems of transmission. The most recent of these "carrier" systems provides for transmission of 1,800 telephone conversations over one pair of conductors (in one direction) by use of different frequencies stacked closely together on the same conductors. This system is applied to the coaxial cable, and gives the ordinary coaxial cable having eight coaxial units a capacity for 5,400 telephone circuits—even after allowing for the assignment of one pair of coaxial units as reserve.

A second type of facility transmitting a broad band of freqeuncies and having a great capacity for multiplex operation is the radio relay. Beams of radiant energy using frequencies of four billion cycles and employing antenna horns and lenses ten feet square are sharply focused from tower to tower 25 to 30 miles apart. At the present time each radio channel has a capacity comparable with that of the L-1 coaxial cable system: 600 telephone circuits. This is sure to be increased with the further development of this remarkable new transmission system. Already 650,000 miles of telephone circuit are provided by this system, and its use is expanding rapidly.

Techniques are being developed for the use of still higher frequencies for electrical communication. Experience today indicates, however, that when the frequency is pushed very much above ten billion cycles, the interference with transmission by rain and other atmospheric conditions increases rapidly. We quickly approach the limitations of the transmission of light itself. For still higher freqencies, therefore, it seems probable that it will be necessary to provide our own atmosphere. This can be done with what are called wave guides: i.e., hollow tubes like a coaxial unit with the central conductor omitted. Wave guides are already widely used for short distances in the apparatus of radio relay systems and of radars and other applications of the current ultra-high-frequency technique. They show promise of becoming the superhighways of communication of tomorrow—high-

HAROLD S. OSBORNE

On August 31, Harold S. Osborne, Chief Engineer of A. T. & T. and an internationally known communications engineer, retired after 42 years of service with the Bell System. After receiving his doctorate from M. I. T., he joined the Bell System in 1910 and began work on transmission and protection problems. Advancing steadily through the years, Dr. Osborne was appointed A. T. & T. Chief Engineer in 1943. During Warld War II, he served as consultant to several federal government agencies and since 1951 has been a member of the Domestic Communication Industry Advisory Committee of the National Production Board.

ways which will accommodate on each channel telephone circuits by the thousands rather than by the hundreds.

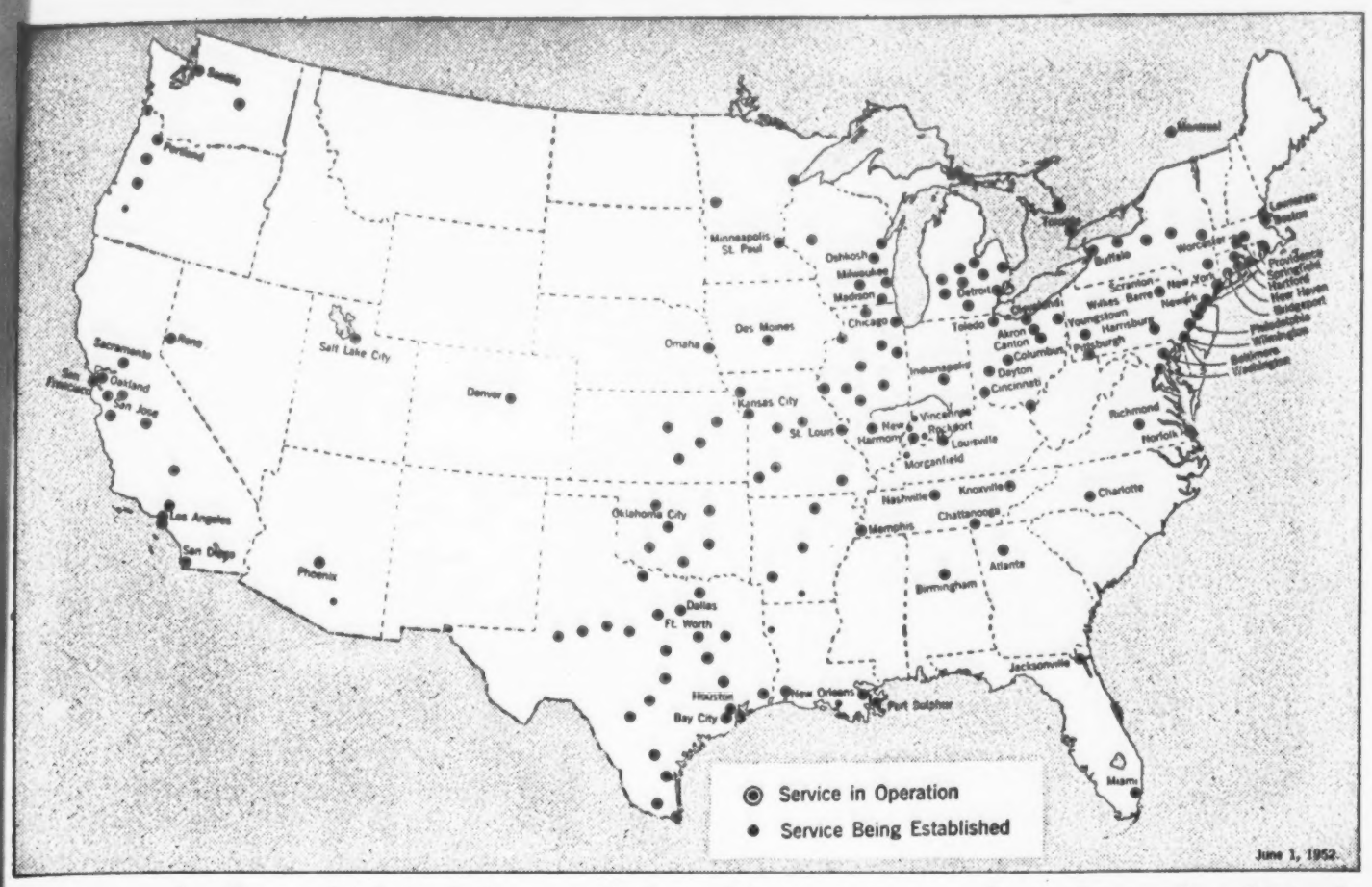
A special case of long distance telephone and telegraph transmission is presented by overseas transmission to the other continents of the globe. The present method of giving service, primarily by high-frequency radio channels, has served excellently for the establishment of the service and its development during the past 25 years. Now this method is rapidly being outgrown, both in the amount of service demanded and in the quality of service —which is increasingly important because of the growing dependence on this form of communication by government, industry, and individuals. For the long look ahead, it is safe to say that new techniques will be developed which will release this service from the limitations of the present transmission method.

A good deal of progress has been made in one direction: namely, in the design of a telephone cable, equipped at frequent intervals with telephone repeaters, laid at the bottom of the sea and capable of transmitting numbers of telephone messages simultaneously through a pair of cables. The design of telephone repeaters which can be spliced into such a cable, will survive the rugged service conditions of submarine cables, and will operate for decades without requiring any maintenance, involved formidable technical difficulties. Such repeaters, however, are now in service on a cable between Key West, Fla., and Havana, Cuba, operating in water 6,000 feet deep. So far, in their first two years of life, they have given very satisfactory performance.

Development of Switching Systems

Along with the development of transmission systems, there have been—and are continuing—equally remarkable developments in switching systems.

The use of automatic machinery for the switching of local calls has long been recognized as an economic and service objective, and has been extended to 80 percent of the telephones of the Bell System. Dial systems, as they are called, are complicated, and they constitute an increasingly important part of the equipment used in giving telephone service. Great strides forward have been made in recent years through the development of crossbar systems. Electronic systems of switching are the subject of active research. For the long pull, it seems safe to predict that great changes and improvements will come out of



● Bell System mobile telephone service is or will be furnished through special equipment in the cities indicated.

the research effort which is being applied to this important subject.

Today the Bell System Companies are proceeding rapidly with the extension of dial methods of operation of long distance calls—even on a country-wide basis. Some time ago a fundamental plan was developed by which a toll operator at any point will be able to complete long distance calls to any other point in this country or in Canada directly by automatic machinery without requiring the attention of operators at other points. The Bell System is well on the way to putting this into effect. At the present time, more than one-third of all toll board calls are handled in this way.

The central core of this system is the No. 4-type toll switching system, of which possibly 85 will be required for the complete nation-wide service and of which 16 are now in service. The first 4-A systems containing all of the features required for the nation-wide plan will be placed in service in Scranton, Penna., and Newark, N. J., early next year. These switching systems, when the plan is fully effective, will, when a call is placed, receive a 7-digit or a 10-digit number representing any telephone in the country and proceed with all of the operations necessary to complete the call.

The formulation of the plan of which this forms a part has required years of coordinated planning and study by the telephone companies throughout the country to provide for a national toll numbering system, toll switching and routing plans, and to determine specifically the functions which the 4-A systems must be capable of performing in order that the entire nation-wide system can work with efficiency and economy.

A remarkable feature of this development is a further improvement in the speed of long distance service because of the great speed with which the machine can make connections, test routes for available circuits, shift over to alternate routes, and find its way through the great dial network of the country to the called telephone number.

While proceeding rapidly with arrangements for nation-wide dialing by the operator, the plan has contemplated from the start that nation-wide customer dialing would ultimately be provided. With this in view, the 10-digit national numbering plan is based upon the local telephone numbers, with the addition of a minimum number of digits to represent the geographical area to which the call is directed.

When the customer instead of the operator is to dial through to the desired telephone, an important added requirement is involved. With customer dialing, the machine must make automatically a record of all the details of the call upon which charges are based—a record which otherwise is made by the toll operator. Various forms of equipment to do this are now in extensive use for short-haul calls. Equipment suitable for general long-haul customer dialing is being developed.

In the meantime, a trial arrangement of long-haul customer dialing has been established on one local office: Englewood, N. J. Telephone users at Englewood can dial directly all telephones in any of eleven large city areas scattered throughout the continent from Boston to San Francisco. With this form of operation, the bell of the called telephone normally rings 15 to 20 seconds after the dialing is completed, compared with 90 seconds' average for the service given today.

The results of the Englewood trial are very encouraging. The customers are dialing 96 percent of all the calls it is possible to dial. Difficulties due to wrong numbers

(*Continued on page 74 col. 1*)

"Wireless Telephone": an experimental set containing a very-short-range radio to eliminate the customary telephone cord.

- 301st Signal Company Covers Fort Hood, Texas Maneuvers

EXERCISE LONGHORN

Coverage of Exercise Longhorn maneuvers at Fort Hood, Texas, by the 301st Signal Photo Company, Camp Gordon, Georgia, produced a veritable mass of prints and film footage, as well as a lot of behind-the-scenes stories, according to Major R. L. Leonard, commanding officer of the 301st.

The company had the mission of supplying basic photographic support for the exercise. All photographic operations were under the maneuver J-5, with assignments for Army and Air Force handled by representatives of the two services in the J-5 office. Major D. E. George, Headquarters, Fourth Army, was Maneuver Photographic Officer. In handling all news and publicity photo coverage, the 301st relieved photo units of the 31st and 47th Infantry Divisions, the 1st Armored Division, the 82nd Airborne Division (on the Aggressor side), and 15th Corps of all but tactical and operational types of photography.

Major Leonard praised the men of his unit, saying, "The boys did good work. They accomplished everything they set out to do. The work at Longhorn proved that they're ready to cover any type of field operation. Comparing Longhorn to Southern Pines, which we covered last summer, I would say quality of the work was up 100 per cent and the story coverage much more complete."

The 301st was given an official citation for its coverage of Southern Pines.

Statistics-wise, Major Leonard said that 5000 still pictures were taken and made into 33,000 prints and 69,000 feet of 35 mm motion picture film was exposed. The prints and film are used by the technical services, historical records and public information.

Trucks used to haul men and equipment from Camp Gordon to Fort Hood, around the maneuver area and back to Camp Gordon, rolled up a total mileage of nearly 40,000 miles for the unit. Trucks averaged 7,000 miles per week in moving back and forth across the maneuver area. During the three months the 301st was away from Camp Gordon, there was only one accident to a company vehicle: a slightly dented fender, suffered 100 miles from Camp Gordon on the return trip.

Major Leonard remarked that pictures were taken from plane, helicopter, tank, jeep, truck and ground, and one enterprising photographer even talked his way into a jet trainer so he could get a close-up shot of another jet in flight.

Also assigned to Longhorn was an aerial detachment of five L-19 light airplanes, five pilots, five Signal Corps photographers, and necessary equipment for processing aerial roll film. One of these planes was assigned to each of the participating divisions and one to the 185th Signal Battalion (Corps). They were used to demonstrate the tactical capabilities of aerial photography in a tactical situation. Aerial photographs were made available to those requesting missions in an average of two hours from the time of making the request. For the most part, this was done without the use of the latest developments in field laboratory equipment.

A major part of Longhorn tactics called for airborne personnel, with men of the 82nd Airborne Division jumping twice and those of the 508th Regimental Combat Team jumping once. Pictures of these jumps were taken from every conceivable place and angle. One photographer leaned

An open wire pole line construction erected through a deep gorge during the maneuver. Rugged terrain added to the normal difficulties encountered.

over so far out of the escape hatch on a C-46 transport to get a shot that two other men had to hold him by the feet to keep him from following the jumpers to earth. All photographers wore parachutes while taking pictures from the air.

One picture that evolved from the 82nd Division's jump was published across the country. Major Leonard pointed out that the picture shows every phase of a jump after leaving the plane: man coming down on emergency chute, many more men coming down with their regular chutes, men landing, men rushing to the assembly point after landing and men packing up their equipment.

This one picture was estimated by Associated Press to have appeared in more than 100 papers the same night the men jumped. The picture was processed and printed, routed through public information office channels and to the AP wires 15 minutes before any other shots of the same jump by other photographers.

Men of the 301st set up shop in a converted supply-orderly room building at Fort Hood. Three days after their arrival they were printing pictures and were still printing up to 24 hours before leaving for Camp Gordon.

Major Leonard explained that the photo laboratory was in operation 24 hours a day through much of the exercise. He said it wasn't uncommon for the men to leave at 4:30 and 5:00 a.m., not to return until 9:30 and 10:00 p.m. Then they would sit down to write captions until midnight. During the time they were there, the men only had two weekends off.

On rainy days, the photographers went to bed, laboratory personnel kept working, and motor crews jumped for a chance to work on the trucks. Rainy days were also the only days the mechanics had a real chance to give the fleet a thorough working over.

The 301st covered military government personnel in their "occupation" of Lampasas, Texas, a town of 3,500, several miles from Fort Hood. Aggressor forces moved into the town, with prior arrangement with local authorities, and set up a military dictatorship.

The mayor and other office holders of the town were thrown in jail, schools were closed down and barbed wire strung around the buildings, aggressor flag was run up on the flag pole, and "half the townspeople were to be shot at sunrise." Three days later, friendly forces moved in, freed the prisoners and restored peace and quiet to the town.

This printing and enlarging equipment used by the 185th Signal Battalion was installed on the right side of a K-53 photographic laboratory truck during the maneuver.

Another phase of Longhorn was the use of psychological warfare, particularly with Laura and Lorelei. Laura was the home girl for the friendly forces, while Lorelei was the "aggressor siren." They were on the air constantly, with news and propaganda for opposing forces. Both women are WAC's with particularly sultry voices, Leonard added.

The two girls and their roles were the subject of a special 15-minute film taken by the 301st. A special radio script was written and studios at radio station KHIT in Lampasas were turned into movie studios.

Additional travel for several teams of the 301st came in covering the airlift part of Longhorn in its entirety. The teams were flown to Shaw Air Force Base in South Carolina. The airlift then started and was recorded in both movie and still pictures on the flight back to Texas and into the maneuver area.

One team of 20 men and one officer went directly from Operation Snowfall in New York State to Longhorn. The same team then went on to the recent A-bomb blast at Desert Rock. The men had been away from Camp Gordon since last December.

The 301st Signal Photo Co., is the only company of its sort in the Zone of the Interior. The 301st is training under the direction of the Unit Training Group of the Signal Corps Training Center at Camp Gordon.

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Members of the 2060 Mobile Weather Squadron use a weather balloon and theodolite in checking weather conditions during "Exercise Longhorn." The Weather Squadron provides weather information to the tactical Air Force and Army field units.

From an Early Radar Diary

July 1935 — December 1938

By: Harold A. Zahl

During the middle of the prewar decade, a small group of scientists and engineers at Fort Monmouth, New Jersey labored under great secrecy developing a military weapon destined to play a major role in winning a global war. Midst a complacent, peace-loving United States, these pioneers worked in silence, desperately handicapped by lack of funds, facilities and assisting personnel. Driving, ever driving, inexorably striving toward a military objective of utmost importance were Major General (then Lt. Colonel) Roger B. Colton (formerly CAC), early laboratory director Colonel William R. Blair, and civilian engineer, the late Paul E. Watson, whose combined inspiring leadership seemed to convert normal engineers and physicists temporarily into composites of Newton, Maxwell and Einstein. From the efforts of this Army group, from a similar group in the U. S. Navy, in England, and later in the Office of Scientific Research and Development, rose the greatest of all electronic military weapons, the weapon to which victory attached her wings, a device which saluted the atomic bomb but did not bow to it . . . the fabulous scientific genie of World War II—RADAR.

It was radar and the magnificent skill and courage of the RAF which won the Battle of Britain in 1940. It was radar again, across the world, in a dismal though great technical success, warning of the impending Japanese attack on Pearl Harbor, albeit, in one of history's greatest tragedies, the warning was misunderstood. In the bloody years which followed, it was radar always in the vanguard, from the early stages of desperation and defeat, paving the way to victory . . . against the dreaded Nazi U-Boat, Goering's vaunted Luftwaffe, and the mighty Imperial Fleet and aircraft of the Japanese; all these were first fought to a standstill, pursued—and then finally destroyed!

In the vast panorama of radar literature, the pioneering period has been almost overlooked, since with the sudden onrush of war, acceleration in the field became so great that the early years were quickly dwarfed into apparent insignificance by the stupendous effort of ten thousand scientists and four billion dollars thrown into the radar war chest.

This narrative deals with an almost forgotten period in Army research when a few men sweated and created in the dark room of secrecy so that radar might be ready if war came. Yet, this is not a story of physics and engineering except for its ever-present background. It is a tale of achievement by visionary men who both literally and figuratively had their sights aimed on the stars. It is a story of life, with rich comedy and near-tragedy—it is a tale of many failures, but of ultimate and glorious success.

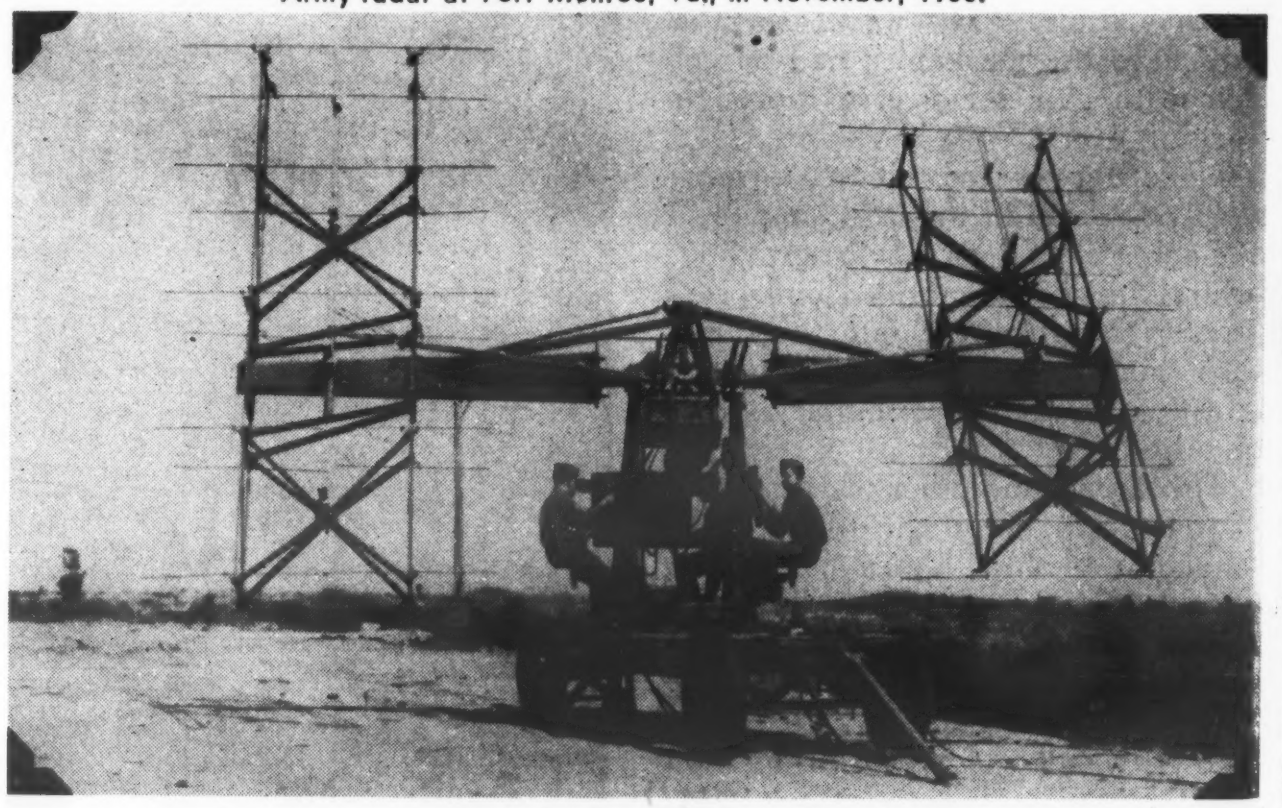
Fort Monmouth, New Jersey—1935.

* * *

The 29th of July arrived as any other day for most of the civilian scientists and military personnel of that peaceful Army post, yet within a few, hearts beat more rapidly, for the day meant much to those within the inner circle of the "Detection Project." All through the day scientists and Army personnel inconspicuously shuttled back and forth between the laboratory and a point on the ocean's edge, ten miles away. By nightfall, all such activity ceased as though the day had ended and work was done.

In nearby Highlands, many unsuspecting residents were on the beach as the hour approached midnight, for July 29th had been exceptionally hot, and on the water's edge a slight breeze was ever-present, even though a few hundred yards inland the warm sul-

Early radar tracking device for giving the angle of elevation of target plane. This photograph shows part of the equipment tested by the Coast Artillery in the first service test on U. W. Army radar at Fort Monroe, Va., in November, 1938.



Reprint from *Coast Artillery*, March-April, 1948 with permission.

An SCR-270 Radar was placed on the top of a mountain peak to give early warning on aircraft within a radius of 150 miles.

try air was motionless. The outline of people could be made out, some sitting on the sand, others lying on blankets. At the edge of the surf, the motionless silhouettes of fishermen could be discerned with long calcutta rods extended upward and toward the sea, patiently poised and waiting for hungry, unsuspecting striped bass.

The only noise was the soft murmur of gentle waves rhythmically breaking on the shore in the eternal cadence of the sea. To the north the brilliant lights of Coney Island flashed along the horizon, like jewels in a gigantic necklace. To the east all was black, except for the monotonous blinking of the lightships marking the channel entrance. Overhead, the shaft of Navesink Light intermittently flicked its time-honored message, that here was America.

At exactly midnight, the tranquil scene was suddenly interrupted when from the shadowy background a great light of dazzling and unearthly brilliancy flashed seaward with such suddenness that the beach occupants, for a moment, felt a surge of fear. Far out to sea at the end of pencil-like beam stood the ghostly outline of a large ship—as though magically placed there by a supernatural force. No running lights were in evidence.

As suddenly as it appeared, the light vanished. Darkness again enveloped the phantom ship . . . utter oppressive, inky blackness; it could almost be felt.

From a vantage point of higher ground, a few men gathered and waited, too amazed for speech. Without warning the light again flashed its awesome illumination seaward, boring a hole through the night, its blinding glare instantly pointing out the ghost-like hull of the same vessel, now in a new position and swinging hard to port.

In August, 1935, this searchlight guided by a "mystery ray" spotted a cruiser 10 miles at sea in 48 out of 51 tries during an Army test. When first released, the caption for this photograph said that "this is one of the Army's new defense weapons."

"My God," a fisherman softly swore, "it might as well be a sixteen-inch gun as a searchlight!"

For three hours the weird spectacle continued. The destroyer cruised over all the outer waters of New York Harbor, running without lights while the searchlight, with uncanny sense, intermittently flashed its light, and found the victim always squarely in the center of the beam.

Hours later, across the nation, headlines carried the story "Mystery Ray 'Sees' 'Enemy' at 50 Miles," said the *New York Times*—"Army Mystery Ray Spots Ship 48 out of 51 Times," cried the local Long Branch *Record*—"We have a mystery ray," solemnly stated Arthur Brisbane, devoting most of his column to the amazing event.

Through a week of unsolicited publicity the Army remained sphynx-like in its silence, while an imaginative press built up stories, applying the "mystery ray" to high-flying airplanes and revolutionizing modern naval and aircraft warfare tactics. What the Army could have said, but didn't, was to verify that a new weapon of war had been born and that the imagination of the Press corresponded very closely with the truth. But the facts were kept secret for more than a decade. The new weapon had an appointment with destiny and the date was somewhat uncertain—like some 7th of December!

But let us turn the calendar back even further, and view the story from backstage.

In 1935, the Signal Corps completed an important phase of its harbor surveillance program for the Coast Artillery, then charged with all aspects of detecting marine and aerial targets for the Army. A detector, so sensitive that heat given off could be picked up as a ship came over the horizon, was ready for demonstration. The places selected for the tests overlooked the approaches to New York Harbor. The tests were centered around the destroyer-type ship, the *Pontchartrain*, provided by the Coast Guard. Orders were to choose a random course outside of the harbor and to run without lights. The new equipment with a searchlight simulating a coast defense gun coupled to it would search for the vessel. If the invisible vessel could be found and directly il-

Transmitting antenna used during tests of radar in May, 1937 at Fort Monmouth.

luminated without searching, a "hit" was to be scored.

In cooperation with the above plan, the Lighthouse Department of the Department of Commerce sent out the following brief notice to Mariners on July 16th:

> "A searchlight will be used for experimental purposes at Navesink Lighthouse intermittently between 9:00 PM and 12:00 PM during the period between July 30th and August 9th, 1935. The searchlight will be used principally over an area extending some four miles southeastward from Scotland Lightship."

On seeing the above notice, a very alert and highly imaginative local reporter, sensing an important news item, submitted a story to a New York daily, surmising that the Army was going to make some very mysterious tests during the period indicated. His story was given front page space. Metropolitan reporters quickly came down to the scene and queried the Public Relations Officer of the Signal Corps for information.

"Yes," said the Public Relations Officer pleasantly with his best smile, "there are certain tests contemplated, but nothing more can now be said—except that the area will be closed to visitors!"

The reporters left, extremely unhappy and dissatisfied. With sabres starting to rattle in Europe, anything pertaining to U. S. military activity was front page copy.

Later in the month, a cordon of military police was suddenly thrown around the Lighthouse grounds and the area restricted to only essential traffic. This leaked out to the press and naturally, they grew even more curious. They were now certain a big story was about to break at Navesink, but there they faced husky armed guards whose vocabulary appeared limited to the word "No!"

Not to be outdone, however, some reporters remained close to the restricted area enjoying the entertainment offered by the Jersey beaches in the vicinity. Some even took to night fishing. Of the ever-presence of the Press, the Signal Corps was well aware, for each day reporters called. As a ruse to avoid publicity, and following an honored military principle that surprise is the most powerful of all weapons, the Signal Corps quietly changed the starting time for the tests from 9:00 P.M. to midnight. It was reasoned that after midnight the shore inhabitants and possibly even reporters would be asleep. But such was not the habit of the Jersey folk on a hot summer night, let alone reporters.

So it came about that at midnight on 29 July, 1935, an 800,000,000-candle-power light lashed out in pursuit of the blacked-out destroyer; and the rest of the story has been told, or at least almost—

By wire and radio the story carried by the U. S. newspapers was flashed to all parts of the world. Far across the Pacific, the war lords of Japan read of the U. S. mystery ray in Japanese newspapers. Mystery rays and activities related thereto were particularly of interest to Japanese military and naval cliques of that period. Unfortunately they thought the news stories were too incomplete and did not appear to contain authentic technical information. Details were desperately desired. Perhaps they reasoned the good neighbor policy might be extended across the Pacific and the U. S. Army would be so kind and fill out the gaps—

So one morning in October 1935, a letter came to the Signal Corps asking with arrogant meekness for details of the recently completed tests. Captain Lawrence Clayton, who later transferred to the CAC, opened the letter, first blinked once or twice and then rushed for the Office of the Commanding Officer for the letter was on the official stationery of the House of Okura, and the Captain knew that the largest single stockholder of that Company was none other than His Imperial Highness, the Emperor of Japan!

The Army's reply to the request was, needless to say, a classic, even in military brevity and terseness.

Months followed . . .

The equipment tested at Highlands, New Jersey was taken to Fort Monroe, Virginia, for tests by the Coast Artillery Board and before members of the Army General Staff. From these tests came three decisions of great future significance: First, the use of infrared for detection of aircraft did not appear too promising, since the problems introduced by absorption of fog, clouds, snow and rain appeared basically unsolvable; second, other methods must be given greater emphasis, particularly the use of radio waves which pentrated all atmospheric variations; and third, the General Staff assigned full responsibility for the research on detection of aircraft and marine targets to the Signal Corps.

With the phenomenal success of the military airplane and with Goering's Luftwaffe already blackening the skies of Europe, it became increasingly obvious that the Army's most important defense problem was aircraft detection. But that meant detection for protection of only *military* targets, for the year was 1936. Those were crape-hanging visionaries who

With this issue, Dr. Zahl becomes a member of the staff of SIGNAL in the capacity of Contributing Editor. Dr. Zahl, who is Director of Research of the Signal Corps Engineering Laboratories, Fort Monmouth, New Jersey, will be remembered by readers for his past articles in SIGNAL. He has been associated with the Signal Corps since 1931, and from that time until his appointment to active military service in 1942, Dr. Zahl participated in research and development programs on such projects as sound, infrared, electron tubes, radar, etc. Particularly, he was closely connected with radar from its inception and was responsible for research and development leading to a number of vacuum tube types used in World War II equipment. As an Army officer, he continued to serve with the Signal Corps Laboratories on matters pertaining to the development of electronic equipment and components for use by the Armed Forces. Since his separation from the Army in 1946, with the rank of Lt. Colonel, Dr. Zahl has continued with the Signal Corps Laboratories to his present position. He is a member of AFCA, many scientific organiaztions, and numerous government and civilian technical committees.

predicted indiscriminate bombing of cities in future wars. The word "blitzkrieg" did not exist. In fact, nuclear physicists were even considered unimportant and regarded only as absent-minded professors wasting their time exploring an atomic dead-end street.

With the decision of the General Staff proudly tucked away, the Signal Corps scientists returned to Fort Monmouth for further research. Gradually infrared was displaced in importance, for of far greater significance were findings that radio pulses reflected from an aircraft produced distinct echoes which told precisely where the aircraft was, and what was equally important, these waves passed through all types of atmosphere without absorption.

Funds were now desperately needed, since new and expensive type of equipment was vital to the experiments. The question was "would the current breadboard model remain in satisfactory service for sixty consecutive minutes so a demonstration could be given before influential people who controlled the "military money bag"? An unsuccessful demonstration could do more harm than good. It was a great risk, but the decision jointly made by Colonel Blair and Colonel Colton was "the chance must be taken," based on the knowledge that when the equipment was working properly, positive detection of aircraft could be achieved as far as twelve miles—a most amazing accomplishment for that period and carrying almost guaranteed appropriations if successfully demonstrated.

Arrangements for the critical demonstration were scheduled for May 1937 by the Chief Signal Officer, Major General James B. Allison. General Allison had no trouble in obtaining top-flight dignitaries for the demonstration . . . such was the importance of the problem. In fact, never had Fort Monmouth played host to so much "brass." Included were Secretary of War Harry H. Woodring, Chief of Staff Malin Craig, members of the Congressional Military Affairs Committee, Chiefs of the Air Force, Coast Artillery, Signal Corps and other high-ranking military personages.

On the crucial night, a B-10 bomber, with lights turned off, was scheduled to attempt a "sneak raid" over Fort Monmouth; a simulated battle situation of antiaircraft guns against a bomber. Success for the new equipment would be measured by whether searchlights could be directed so as to illuminate the airplane in time for early effective antiaircraft artillery action, while failure would be registered if the bomber had time for a successful bombing run before detection. Little did anyone connected with the tests dream that only a few years later the same situation would occur a thousand times in a night—but with death-dealing bombs being dropped and with antiaircraft fire thundering over all of England, filling the skies with steel—and London aflame!

The Secretary of War and his guests were particularly asked to watch one searchlight which was coupled to the radar equipment and which could automatically point in the direction indicated by the apparatus under test. Three other searchlights within a mile radius would add additional support for the radio-controlled light. When a target pickup was made by any of the four lights the other three would immediately swing over and cooperate to intensify the target illumination. The search area for the three supporting lights was to be in the vicinity of the tip of the beam of the radar-controlled pilot light.

Darkness came slowly that night, time appeared to drag . . .

Mitchell Field finally flashed a message stating that the bomber was en route and would approach Fort Monmouth at an altitude and direction of the pilot's own choosing, and with all running lights extinguished.

The search was underway. The distinguished guests stood around various pieces of equipment watching meters and other mysterious electronic devices which the Signal Corps said could detect airplanes.

Twenty long minutes passed . . .

The stillness of the night was broken suddenly by the loud staccato voice of sergeant Harry Belot shouting, "In action!"

Almost immediately the pilot searchlight pierced the low northerly sky. In quick succession the three companion lights appeared and their waving finger tips razzle-dazzled in the area pointed out by the light operating from radar data.

Seconds later, first one, and then several people were heard to cry, "There he is, in Number Two light . . . !"

Flying at about 10,000 feet, slant range about 6 miles, was a speck at the end of the pencil of light which looked like an iridescent fly. One by one, the supporting lights moved over to aid in the track and majestically, the airplane was escorted over his "bombing area"—a perfect target for aitiaircraft guns!

The visitors were impressed. The Signal Corps was delighted. But now for a few more runs—after all, a certain element of luck might have been present on the first test with fate smiling on the groundmen.

All searchlights were extinguished. The bomber was instructed to turn and fly north about twenty or thirty miles which was beyond the range of detection. He was then to turn and at any altitude he wished, fly in toward Fort Monmouth on any approach within the northern ninety degree sector. Until he signalled readiness the radar gear was to be idle.

Detailed view of range-finding equipment located in rear of azimuth antenna used in the May, 1937 tests at Fort Monmouth.

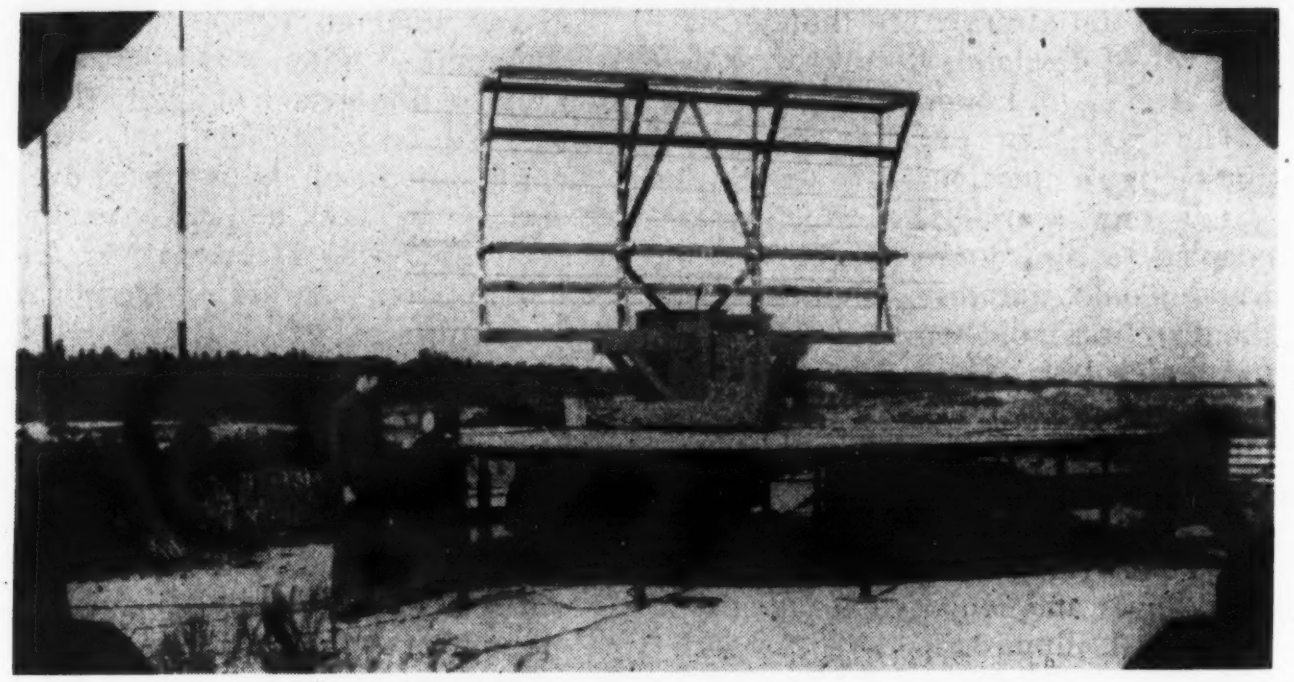
Detailed view of radar and thermal-control unit tested at Fort Monmouth in May, 1937.

About fifteen minutes later the pilot laconically messaged, "Am starting back. . . ."

Again everyone on the ground became tense and alert. Some watched the equipment; others watched the sky; but all listened, for if the muffled roar of a motor overhead could be heard, it would signify failure for the radar, for in war it would have meant "bombs away!"

Operating personnel suddenly pointed out a flickering vertical line on a cathode ray tube which they said corresponded to an echo from the target. From the motion and position of this and similar indications on adjacent devices, it was explained, it could be determined that the airplane was approaching Fort Monmouth 30 degrees west of north at 140 miles per hour, 10,000 feet altitude, and that its present range was 20,000 yards.

When the range indicated was 12,000 yards, which was within search-



Transmitting antenna for first service test radar, October, 1938.

light capabilities for visual detection, the Sergeant ordered, "In action," and the dramatic play of searchlights again started. Seconds later, one of the supporting lights made the "pick-up" and again the searchlight crews triumphantly escorted the bomber over the area where theoretically, defending guns could have brought him down with ease. History was being made!

The performance was repeated several more times, and the distinguished guests left. They were more than satisfied that the Laboratory had produced a highly important, new weapon.

On June 1, 1937, the Secretary of War wrote to the Chief Signal Officer on the tests. . . . "It gave tangible evidence of the amazing scientific advances made by the Signal Corps in the development of technical equipment. . . ."

Army radar thus successfully passed its first big hurdle. Congress would follow with a special appropriation. Research could go into high gear . . . but there remains a bit more to the story. . . .

After the distinguished guests had departed, technical and military personnel responsible for the new equipment met for a short critique, combining a few beers with back-slapping and handshaking—everyone was happy. The results were about twice as good as had the most optimistic expected. "Strange though," said one of the engineers, John Hessel, "that most of the initial pickups were made by No. 2 light down by the coal pile."

Certainly it was strange, they all agreed, if true; but had that been the case? Probability would surely predict that the radar-controlled light show the most pickups. In the excitement, no one else had kept count. Hessel, however, was certain of his observations. Others thinking back began to confirm the statements. Members of the searchlight crew were certainly to be congratulated for their outstanding performance.

Several days later, one of the radar engineers met the Corporal whose searchlight had performed so spectacularly. The engineer commended the man, who replied:

"Thanks, but it was easy. Remember that low white cloud during the night of the test? Well, my eyes have pretty good night vision; as a matter of fact, better than the other fellows. The lights of Red Bank reflected against the cloud so that I could generally see the plane with my naked eye even before the searchlights were turned on. Couldn't help making a hit almost every time."

"But Corporal," the crimson-faced engineer broke in, "Don't you know . . ."

"On the other hand," the enthusiastically naive Corporal continued, "that new secret gadget is all right. Why every time you fellows turned on the control light, it was pretty close to the target. Almost as good as my eyes."

The engineer, in a split-second decision, swallowed his temper and chagrin, and in turning on his heel, said, "Congratulations, Corporal," for great was the engineer's faith in radar, and too, he recalled the never-ending feud between the men of the air and the men of the ground; for those were the days of the sound locator, and searchlight crews followed the normal competitive code of the day which was to illuminate the airplane as quickly as possible taking advantage of every break lest "they" get you first. They were soldiers, not scientists—who ever heard of ethics in a fox-hole?

A year passed and with a special appropriation of $40,000, obtained partly through the efforts of the Chief of Coast Artillery, a completely new and far more reliable radar was designed and constructed. The device was additionally unique in that incorporated therein was a detector capable of indicating the heat from airplane motors or exhaust pipes on a rough television-like screen. Built around this device was the new radar equipment providing azimuth, elevation and range; the thermal unit with its intrinsically higher accuracy to be used only for short range work and in clear weather.

Arrangements were made for tests to be conducted for Service suitability by the Coast Artillery Board. Months had already been spent making final preparations in a heavily guarded and secluded area located at Fort Hancock, New Jersey. There were many unexpected last-minute difficulties. The antennas, which were of metal, did not function exactly as had been worked out in newly developed theory. Errors were present which had to be eliminated in order to achieve the minimum accuracy for antiaircraft purposes.

While technical personnel labored feverishly in order to meet the scheduled summer date, fate again joined the radar staff, for winging its way northward from the Caribbean came the great hurricane of 1938, devastatingly sweeping up the Atlantic Coast and striking New Jersey with full impact. Winds reaching a maximum of 106 miles per hour passed over Fort Hancock where the new equipment was being assembled. The flimsy experimental antennas and their moorings were dashed about the beach and destroyed!

(*Continued on page 69 col. 1*)

By - Gr. Col. A. K. Ransom

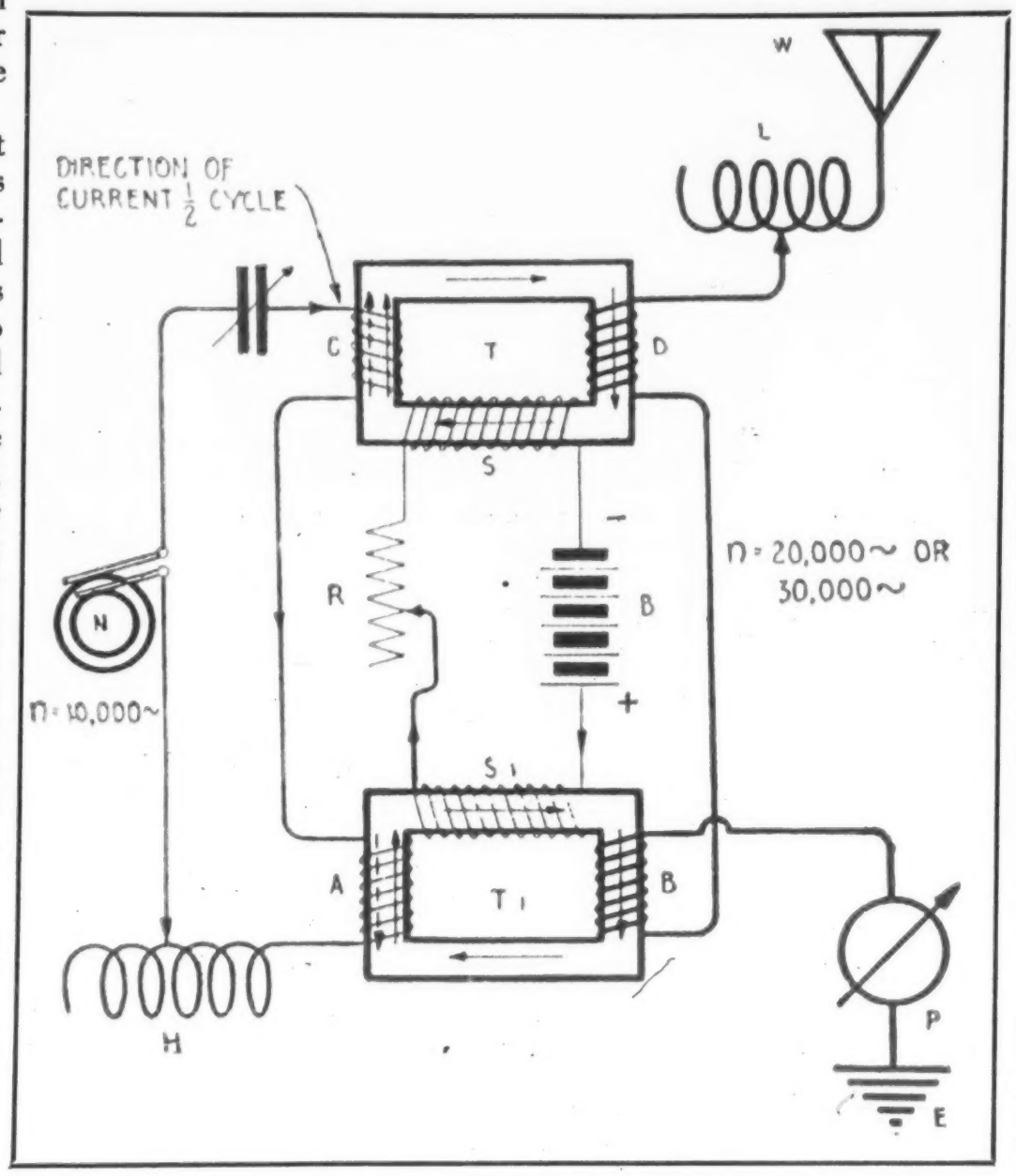
DOING IT THE HARD WAY

In our last issue we described a type of installation which was passing traffic back and forth across the Atlantic about 1917. One hundred ninety-two of you folks out front wrote in giving locations where such stations operated. We have no complete record of all installations of the type but the two most famous were at Glace Bay, Nova Scotia and Clifden, Ireland. Now see what you can do with the

FROMO-WENNELIZER*

"The radio station at Sayville, Long Island, employs an unusual system for the production of continuous waves. In this system a specially designed generator having an initial frequency of 10,000 or 15,000 cycles per second is connected to two transformers having magnetically saturated iron cores which are designed to double or triple the frequency of the alternator.

"A fundamental circuit diagram of this system is shown here. An alternator N having an initial frequency of 15,000 cycles per second is connected to the two specially designed transformers, T and T-1. Transformer T has the excitation winding S, which saturates the core fully, a similar winding S-1 being provided for the transformer T-1. A source of direct current for the excitation windings S and S-1 is indicated at B with the regulating rheostat, R, connected in series. The current generated by the alternator N flows through the primary circuit being tuned to resonance with the initial frequency of the alternator by the variable inductance and the variable condenser connected in series with the circuit.



"The *secondary circuit, or antenna system*, embraces the windings D and B connected in series with the antenna inductance L, the earth connection E and the aerial wires W. The hot wire ammeter P is connected in series with the earth lead to determine conditions of resonance. As initiated previously, the transformers T and T-1 are fully saturated, the magnetization being brought to the knee or bend of the characteristic saturation curve by carefully regulating the rheostat R.

"To illustrate the functioning of this apparatus, let us assume that the primary coils are wound on the cores so that the direction of the magnetic lines of force will be that indicated by the *full-line* arrows; furthermore, assume that at a particular half cycle of current from the alternator, the direction of the current through the primary winding is such that the corresponding magnetic flux flows in the direction indicated by the *broken-line* arrows; then the normal flux of the core T will not be increased because this core is already saturated fully, the added flux flowing in the direction of the core flux, but the normal flux of the core T-1 will be opposed by the flux of the winding A and the total lines of force flowing through the core, therefore, reduced. This reduction of flux, followed by subsequent rise to normal saturation upon the completion of an alternation from N, causes two changes of flux through coil B of transformer T-1, resulting in the production of two alternations in that winding for one alternation of current from N. The final effect is to induce current of double frequency in the antenna system.

"Let the next half cycle of the alternator N be completed through windings A and C; then, the change of flux takes place in the core of the transformer T, rather than in T-1, resulting in the induction of two alternations of current in the secondary winding D. Summing up the foregoing, a complete cycle of current from the generator N will induce two alternations of current in the coil B, followed by two alternations of current in the coil D, thereby doubling the initial frequency of the generator current. This current flows in the antenna circuit which has been carefully tuned to resonance, and part of the energy is converted into electric waves.

"By an additional set of transformers, the current of double frequency generated by the first set of the transformers may be again doubled, but the efficiency of the

(*Continued on page 72 col. 1*)

Brigadier General
B. M. Hovey, USAF

ECONOMIC FIELD MOBILIZATION COURSE

Rear Admiral
W. McL. Hague, USN

Rear Admiral W. McL. Hague, USN, Commandant of the Industrial College of the Armed Forces, has announced the schedule of its sixth annual series of Field Economic Mobilization Courses, to be held during the 1952-53 academic year. These courses will be presented in cities distributed geographically as follows:

Houston, Texas, September 22-October 3, 1952

Wichita, Kansas, September 29-October 10, 1952

Baton Rouge, Louisiana, October 13-October 24, 1952

Erie, Pennsylvania, October 27-November 7, 1952

Long Beach, California, November 10-November 21, 1952

Seattle, Washington, December 1-December 12, 1952

Akron, Ohio, January 5-January 16, 1953

Tulsa, Oklahoma, January 19-January 30, 1953

San Francisco, California, February 9-February 20, 1953

Phoenix, Arizona, February 16-February 27, 1953

Miami, Florida, March 16-March 27, 1953

New York, New York, March 23-April 3, 1953

Philadelphia, Pennsylvania, April 20-May 1, 1953

Salt Lake City, Utah—April 27-May 8, 1953

Knoxville, Tennessee, May 25-June 5, 1953

Duluth, Minnesota, June 1-June 12, 1953.

The Field Economic Mobilization Course, of two weeks duration, is a condensed version of the ten-month Resident Course given at the Industrial College of the Armed Forces in Washington, D. C. It is part of the Department of Defense program for Reserve Officers of all the services and for officers of the National Guard. The course presents the problems confronting the country in a mobilization of the national economy for war; outlines the resources and economies of major world powers and areas; and examines methods and procedures for making the best use of resources in support of the Armed Forces. This broad background orientation is valuable to the officers who would be called to command, staff and planning assignments. The approach is entirely educational as the College is not an advisory, planning or operating agency.

Reserve Officers apply, through military channels, to the respective Army, Naval District or Air Force Commanders within whose Command the course is being presented; National Guard and Air National Guard Officers to the Chief, National Guard Bureau. Upon selection, officers are ordered to active duty for the period of instruction.

Executives of industry, educators and prominent citizens are also invited to attend. Because the type of individual who would elect to take this instruction would rarely be able to leave his office for a long period of time, the course is held in industrial centers distributed throughout the country. For the same reason the schedule is limited to 4 hours daily for two 5-day weeks. This permits part-time attention to business affairs. Civilian participants are selected by civilian committees appointed by leaders in the local community.

Approximately 70% of the time is devoted to lectures and the balance to discussion periods and field trips. Officers enrolled receive additional instruction for the balance of the working day. Emphasis is placed upon student participation during discussion periods. Classes in each center total approximately 300, distributed equally among civilian and military and, within the military, among the Services. Since the inception, in January 1948, of the Field Economic Mobilization program, 73 courses have been held in 51 cities before about 16,500 students.

The instructional material embraces several broad areas of information, of which the most extensive deals with the economic potential for war of major nations and world areas. Here, following orientation in geopolitics and economic warfare, the student receives systematic instruction in the important elements of the natural, industrial and other resources essential to the maintenance of a war economy.

This study emphasizes the critical appraisal of this country's economic resources, including power, fuel, transportation, communications, strategic materials, manpower, agriculture, and production plant. The interrelated nature of these resources and their sensitivity to the stresses of a wartime situation are developed.

These considerations are introductory to an examination of the organization of our own country for na-

(Continued on page 78 col. 3)

Reserve Officers and Civilian Leaders attending a field trip to the Overhaul and Repair Department of the Jacksonville, Fla., Naval Air Station as part of the Field Economic Mobilization Course.

Americans Are Rolling Up Their Sleeves!

YES, ALL KINDS OF PEOPLE ARE GIVING BLOOD SO THAT OUR WOUNDED MAY LIVE!

● Today, the blood of a Boston bookkeeper may be flowing through the veins of a wounded kid from a Kansas farm . . . the blood of a pretty Southern housewife may have saved the life of a grizzled leatherneck. For, blood is blood, a God-given miracle for which there is no substitute . . . and when a man's life hangs in the balance and blood is needed, there is nothing else to take its place!

Right now the need for blood is urgent. In hospitals—at home and overseas—many men require four and six transfusions during delicate operations. And the blood *must be there*—when it's needed. So give the most precious gift of all—*your* blood!

Be assured that giving blood is neither difficult nor distressing. And what a thrill there is in knowing that you've performed a really unselfish act! So call your local American Red Cross today and make an appointment. And tell your friends and neighbors about your experience. Let them share the wonderful feeling Americans get when they roll up their sleeves—and give blood.

But—

WHAT HAPPENED TO THAT PINT OF BLOOD YOU WERE GOING TO GIVE?

Call Your American Red Cross Today!

A PUBLIC SERVICE PROJECT · THE ADVERTISING COUNCIL · TENTH ANNIVERSARY

COMMUNICATIONS

The following is an address delivered recently by Admiral Stone at the annual World Trade Luncheon of the New York World Trade Week Committee.

When a speaker addresses himself to a subject as broad as the one I have here today, he should in fairness to himself and his audience define his terms.

Broadly speaking, communications embrace all forms of transportation, whether of goods, people or words. Your time and my experience are both limited, so I shall deal mainly with the electronic transportation of words by telegraphy and telephony—with emphasis on international telegraphy, which happens to be my particular bailiwick.

In what way communications, so defined, may properly be called a "lifeline of world peace, trade, and economy" may also need definition.

There was a time, not long ago, when it was fashionable to say that if Heads of Government could just sit down and talk with one another, there would never be another war.

We are no longer so naive. The trouble we had with Hitler and the trouble we are having with Stalin cannot be traced to anything so simple as inadequate communications. On the contrary, we have in our time seen international relations plumb new depths while the efficiency of international communications achieved new heights.

Today the Russians and ourselves both claim to be the only true champions of peace, but neither we nor they nor the rest of the world gain any real comfort from the fact. No one is so lacking in humor as to lay the blame on inadequate communications. We and the Russians broadcast our respective views daily by every possible means—including Mr. Malik and Mr. Austin hasseling with each other in meetings of the United Nations.

In this particular case, the difficulty is not so much in knowing what the other fellow has to say as in understanding what he means—or in accepting it after we do understand. For peace means one thing to America and quite another to Soviet Russia. To us, peace means to live, with law-abiding minorities enjoying constitutional rights guaranteed by the majority. To Soviet Russia, peace means universal regimentation in the Communist way of life, with no exceptions tolerated.

When two political systems so diametrically opposed as these come to a showdown, peace needs more of a lifeline than a mere exchange of views. At such a time, modern communocations facilities may even endanger peace by encouraging hasty words and actions when sober second thoughts could save the day.

But the influence of communications on world peace is not limited to any such negligible, passive, or negative role as this. On the contrary, the evidence is overwhelming that communications rank with the basic forces of history, both in peace and war. That is why every great empire the world has known has given top priority to its arteries of communication. We learn in school about Roman roads, British sea-routes, and American railroads; but a very considerable ignorance prevails in regarding the part played by telecommunications in the history of the last hundred years.

The surest index of a nation's economic power today is the degree to which its telecommunications are developed —its percapita use of telephony and telegraphy by wire, cable, or radio, both nationally and internationally. It is not necessary, nor is it possible in many cases, to determine causal relationships between the economic growth of a nation and the development of its communications. The important thing is their mutual dependence and support, which can be illustrated in a hundred ways.

For example, after Samuel F. B. Morse perfected his system of communication in 1844, the westward expansion of the United States went hand in hand with telegraphy, as the name Western Union reminds us. So impressive were the economic advantages of this new means of communication that, long before we were able to cross the Atlantic by cable, plans were made and work was actually begun on a tremendous project to link this country with Europe by landline across Canada, Alaska, and Siberia—a route involving no water-crossing more formidable than the Bering Straits. The staggering length of that route, its mountains, its swamps, its wasteland, its almost total lack of roads and railroads, is a measure of what the telegraph meant to men who had known what it was like to be without it.

Another indication of the vital contribution made by modern communication methods to national and international trade and economy is supplied by the British, who, at the height of their free-trade and empire building days, put together the world's most extensive international telegraph network as an essential element of and the logical corollary to their commercial and political supremacy.

The economic advantages that accrued to Great Britain from having the world's principal international communication routes funnel through London were early recognized by other countries, who tried in every way to foster the development of competing cable networks by their own nationals. For example, the United States Govern-

LIFELINE OF WORLD

• PEACE
• TRADE
• ECONOMY

By: Rear Admiral Ellery W. Stone

ment refused to allow a foreign company to land a cable on our shores unless the foreign Government accorded similar privileges to our nationals. In 1920, this policy finally broke the monopoly enjoyed by the British cable in Brazil.

Long before that, private American enterprise had opened its attack on other established British cable positions in South America, when the predecessor company of All America Cables and Radio began in 1879 to lay its cable southward via Mexico, Central America, and the west coast of South America to connect with landlines over the Andes to Buenos Aires. When the circuit was completed in 1891, the cost of a message between the United States and Argentina dropped to $1.50 a word, compared with $7.50 previously charged when the only route was via London and involved two crossings of the Atlantic and several European relays.

Similarly, when the American-owned Commercial Cable Company completed its first transatlantic cable in 1884, the cost of a message between the United States and England dropped to 25 cents a word, compared with 40 cents previously charged by a monopoly of British interests and Jay Gould's Western Union.

I leave to you ladies and gentlemen the value to world trade and industry of this healthy breath of competition that has, by now, brought rates down to 19 cents a word for messages to England and 27 cents to Argentina.

Another kind of benefit, hardly less important, was the commercial and industrial expansion of countries along the main cable routes—countries whose economic importance at the time might not have been sufficient to warrant laying a cable. For example, the American cable to Argentina just mentioned gave telegraphic contact with the outside world to many other countries of South and Central America, with incalculable stimulus to their subsequent expansion—especially when internal telegraph routes were established by cooperation of their governments to bring important interior products to the world market. South American coffee is only one of the many such products whose present importance is almost wholly due to modern communications.

But it was the advent of radio rather than competition in cable laying by Americans and others that closed the era of British dominance in international telegraphy. The Federal Telegraph Company, predecessor of Mackay Radio and Telegraph Company, established the first American commercial transocean radiotelegraph circuit in 1912 between San Francisco and Honolulu, in competition with a cable that was 50% owned by the British, 25% by the Danes, and only 25% by Americans. But Federal at that time was primarily interested in the domestic telegraph field, where it expanded against the intrenched position of Western Union by offering 15 words for the price of 10—a device that the older company finally caught up with last year, in the customary stately fashion of monopolies. Another American radiotelegraph company, following World War I, demonstrated the application of the art to the international field. That company, of course, was Radio Corporation of America.

A principal reason for the success of radio in competition with cables was the relatively inexpensive initial investment, which permitted nations with modest financial resources to establish direct circuits by their own radio stations and thereby collect 50% of the tariff on every message, instead of the nominal fee previously charged by them for handling international messages within their own borders. Finally, technological advances have greatly improved the quality and reliability of radio transmission.

I well remember when we had only long-wave radio transmission and, because there is a direct relation between wave length and antenna length, transmitting antennas were supported by massive, high steel towers spaced many hundreds of feet apart, and receiving antennas as much as 12 miles long were sometimes used. Then the "hams"—amateur radio operators—proved that just as good results could be achieved by means of short waves requiring an antenna no more than a hundred feet or so in length and a power supply of as little as 50 to 60 watts—the same as an ordinary light bulb. As engineers probed the radio spectrum farther, it was necessary to drop the appellation "wave-length" in favor of "frequency." Long wave became low frequency, short wave became high frequency. As research advanced, we found ourselves speaking successively of "very high frequency," "ultra high frequency." I don't know if they plan to go farther; but if this keeps up, the strain on our vocabulary should be eased for awhile, because at the rate we are going we shall work our way up through the great family of electromagnetic waves only to find ourselves in the visible spectrum of light waves. Thus, at untold cost of time and money, science will have achieved the magnificent result of returning us to the point from which we started—when the ancients used to signal from hilltop by light waves from fire, smoke, or reflected sunlight.

Perhaps because that would be too simple, a group of engineers recently tried a new approach and sent a mes-

Fabian Bachrach

The Author

Rear Admiral Ellery W. Stone, U.S.N.R., has devoted many years of outstanding service to major companies in the international communications industry. Admiral Stone has risen through many executive positions in the communications field since 1914, and is presently Vice President and a member of the Board of Directors of the International Telephone and Telegraph Co.; President and Director of American Cable and Radio Corp.; and President of A. C. & R. subsidiaries, All American Cables and Radio, Inc., Mackay Radio and Telegraph Co., and The Commercial Cable Co. Admiral Stone's Navy career began in 1917, and he advanced through grades in the Naval Reserve to Rear Admiral in 1944. As a Captain in 1943, he served as Chief of Staff to Vice Admiral William Glassford, USN, at Dakar and, by designation of the U. S. and British Governments, was appointed by the combined Chiefs of Staff as Chief Commissioner of the Allied Control Commission in Italy from 1944 to 1947 under Field Marshal Alexander. Admiral Stone, who is a Vice President of AFCA, has been awarded many decorations by his own and foreign governments.

sage from Iowa to Virginia by bouncing a line-of-sight microwave off the moon. I admit the interest of the demonstration; but I am managing to hold my enthusiasm in check until someone tells me how I can put it to practical use by making the moon stand still.

For all their fascination with pure science and their amiable disregard of the profit motive, scientists and engineers deserve a full share of the credit for lowering the cost of international communication. They have now brought the techniques of radio and cable communication virtually together through the medium of the coaxial cable, which may be described as a device for guiding radio waves along or through a flexible tube. The result is to increase the message-carrying capacity of telephone and telegraph cables and protect radio transmission from electronic disturbances of the atmosphere, as well as to improve security of communication and to give way-station service. By means of underwater repeaters employing vacuum tubes similar to the ones you use in your radio, a company jointly and equally owned by American Telephone and Telegraph Company and my own parent organization, International Telephone and Telegraph Corporation, has been operating such a cable for telephone and telegraph service between Havana and Key West for more than a year. In Europe, another IT&T associate has helped build a similar link, with 140-mile underwater section, between the Netherlands and Denmark. With or without the use of transistors—a recent invention that promises to do much of the work of vacuum tubes with great savings in size, heat, and power requirements—I fully expect to see transatlantic coaxial cables in service before many years more—with new benefits, as always, to the trade and economy of the free world, through the medium of better service at lower cost.

For it has always been the policy of the highly competitive American international telegraph industry, which has nine companies now in the field, to increase traffic by lowering rates when possible. Notwithstanding the increases forced upon us by rising costs in recent years, the American international telegraph industry is one of the few industries today that offer service at less than prewar prices.

The restless search for improvement and the constant effort to lower cost to the consumer, which characterize our American system of private enterprise, have enabled the American communications industry not only to hold its own but to improve its position relative to foreign competition—90% of which is either government owned or subsidized. Even British Cables & Wireless, our largest government-owned competitor, has recently been questioned in Parliament as to why its traffic with America is shifting to the US international carriers.

I don't know of any responsible person in this country who advocates government ownership or operation of our American international carriers. On the other hand, a case can be and has been made for enacting legislation to permit our competing companies in the international field to merge—under private ownership and operation. Speaking for myself, I can take merger or I can leave it alone, because my own company—the largest of the American international telegraph carriers—is doing all right. But I do feel strongly that no case can be made for reducing our specialized service—so important to you in the field of foreign trade—to a mere appendage of the domestic telegraph service. I note that the President's Communications Policy Board came to a like conclusion in its Report of March, 1951.

I have said enough, I think, to make the case for communications as a lifeline of world trade and economy. Foreign trade is dependent upon transport to move goods and upon finance to transfer funds in payment. But first of all, it is dependent upon communications to bring buyer and seller together and so make possible a quick meeting of minds. The three services of transport, finance, and communications are indispensable to you—they are your working partners. Of the three, communications receives the smallest part of your expense dollar and, therefore probably receives the psychological reaction of the smallest attention. But I am sure you will agree that the business you do today would be impossible in anything like its present scope and efficiency without today's highly developed communications industry.

These services influence far more than your ways of doing business; they are rebuilding the world we live in —in its economic, social, political, and military aspects— and so they are having their effect on us as individuals, as well. For if there is any trend in the world more im-

portant than another today, it is the rise of centralized authority—a thing wholly impossible in its present scope without modern communications networks.

Take your own field as an example. Inquiries and offers no longer originate in one point only, your markets are worldwide. Your business depends less on bulging warehouses than rapid turnover. Where formerly heads of business used to send out high priced representatives to make decisions for them abroad, subject to periodic reports by mail and occasional visits from headquarters, today you centralize your operations almost entirely at headquarters, and, although you may send representatives abroad, the excellence of modern communications is such that you frequently exercise too close a check upon them, denying them the initiative and responsibility that properly should be theirs. And, when a really serious and urgent problem arises, the chances are you take an airplane or fast ship and handle it yourself.

This method may be the only way to cope with today's worldwide complexities when business decisions have to be made in the field. But the fact remains that it is hardly the way to train subordinates in self-reliance, initiative, and responsibility against the day when the reins of leadership will be theirs. And if the trend is already apparent with you resolute defenders of private enterprise and individual initiative, it should be easy for you to imagine how far it has gone in government and military circles, where centralization has always been an inherent trend..

And this brings us back to a final look at world peace, as it is affected by modern communications. The events of recent years have swept a lot of cobwebs from American eyes. As a nation, we now see through such dangerous examples of wishful thought as the comforting illusion that anything which brings people closer together contributes to peace and may even ensure it. We know from painful experience that cable and radio circuits and broadcasting stations, while they bind the world together, do not necessarily contribute to understanding even among free nations, and still less between the free and Soviet portions of the world.

And although communications have played a great and even a decisive part in moulding the modern world, the fact remains that, in any given crisis, they are merely tools to be used well or ill by the men who govern us. Only to the extent that communications are used wisely can they contribute to world peace.

When those who govern us are inspired by a high sense of responsibility and are imbued with the spirit, the motives, the courage, and the other old-fashioned virtues on which this country was founded and achieved its greatness, when our foreign policy is positive and forward looking and not limited to plugging holes or putting out fires, then modern communications can contribute mightily to peace by making possible the swift effectuation of right decisions.

An example that come readily to mind was the organization of the airlift in response to the President's decision to stand fast in Berlin—a decision that served notice on a former ally that there was a limit to our patience.

On the other hand, when those in high places take the easy way out of their dilemmas by letting events shape policy instead of creating policy to shape events, then our marvelous communication networks are powerless to help us. And when those networks are used by men far from the scene of action to hamstring the necessary freedom of decision of men on the spot, they may actually become a handicap.

I like to think of the old days before electrical communications, when the British Admiralty sent Lord Nelson off with a fleet and the simple directive to find and destroy the naval forces of the enemy. To accomplish such a mission in distant waters in those days frequently took months, and, in the interim, you can imagine the state of mind not only of the Lords of the Admiralty but the rest of the British Government, cut off from communication with Nelson and thereby forced to rely on his courage, ability, and judgment. Happily for the course of history, they couldn't do anything else.

Today, with our excellent communications, commanders in the field or at sea have the titles of their historic predecessors but too often not the full responsibilities of their positions. Too often the tactics of battle are determined, not by the commanders in the field or at sea, but by their superiors at home—who are subject all too often to political pressures of the moment that may or may not be in line with the long-range interests of the country.

For example, we now know from captured German documents that have been published, the effect on German forces in the field of this kind of direction by Hitler and the German High Command.

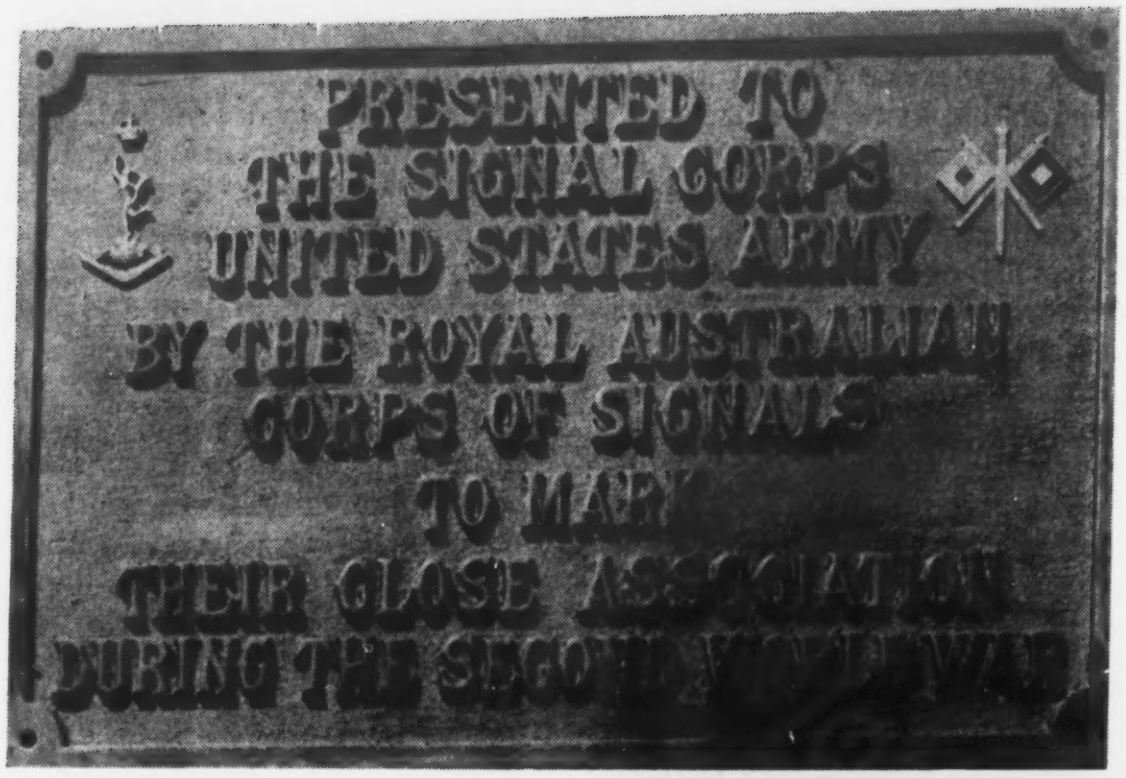
Furthermore, when diplomacy failed to preserve a livable peace and war was necessary to restore it, military men in Nelson's day were expected to achieve victories so the job could be turned back to the diplomats in the shortest possible time. Far removed from the scene of battle, the diplomats had to bow out until the military men finished the job. Because of modern communications, the diplomats today don't seem to be taking as much time off during war as they used to do.

So it comes to this: communications, like many other modern inventions, have contributed greatly to our way of life, but at the same time have brought new problems and responsibilities. Thanks to communications, the free world has the opportunity, if it has the moral strength and will, to marshal greater economic and military strength than the Soviet has at its disposal, without resorting to the same ruthless, dictatorial methods, the same substitution of enslavement for private enterprise.

I think there is every reason for sober hope and firm faith in our future—provided it be combined with hard work on our part and responsible leadership on the part of those who govern us. We have made plenty of mistakes since our military victories in 1945; but at least most of them are known to us today and, being free men, we can benefit from them. The Kremlin has made plenty of mistakes, too, and has tried in every way to conceal them not only from us but from its own subjects. With the aid of modern communications, we are making at least an effort to enlighten the Russian and satellite peoples by government and private broadcasts.

Fortunately for the free world, its safety depends less on the other fellow's weakness than on our own abundant and growing strength, both material and moral. Modern communications, in which the free nations lead the world, play a vital role in our tremendous material strength. But more vital even than material strength is moral strength, when it comes to maintaining peace or winning wars. Here, as in the matter of leadership, neither communication facilities nor any other material consideration is more than a tool.

In the last analysis, the fate of man depends on men. As free men, I do not think we have anything to fear from those who live, work, and even fight under conditions of slavery. Let us look to our leadership and our own moral integrity, and there can be no question but that, as free men, we shall win. - - - — - —



A new high in integrated communications was marked by US Army Signal Corps communicators on July 26, when teletypewriter equipment at Fort Monmouth, New Jersey was linked, over a 25,000 loop mile distance with similar equipment at Melbourne, Australia. The long distance communications took place in conjunction with ceremonies honoring the US Signal Corps by the Royal Australian Corps of Signals.

The teletypewriter contact was established through Signal Corps facilities at Fort Monmouth, Washington, Seattle, Honolulu, Tokyo, and Yokohama into Australian facilities at Kure, Japan. From Kure, Australian facilities were used to reach Melbourne. The circuit, over which traffic could be transmitted and received simultaneously, is believed to be the first instance of such complete integration. The equipment was in continuous operation for one hour and forty-five minutes.

The occasion prompting the establishment of the communications was the Australian presentation of a plaque commemorating the cooperation and close association between the Signal Corps of the two countries during the Pacific campaigns of World War II. A running commentary, describing the ceremonies, was sent to Melbourne over the duplex circuit and several messages of congratulations were exchanged. A total of over 4,000 words were transmitted.

Australian Brigadier Archie D. Molloy and American Major Generals Kirke Lawton and George Back inspect plaque presented to U. S. Signal Corps by the "country down under" during ceremonies at Fort Monmouth on July 26th.

Symbolizing speed of modern military communications and cooperation between Australia and the United States in WW II, Brigadier Molloy dictates a message for transmittal to Australia via teletypewriter (behind signs). Looking on are General Back, Col. L. W. Cumpston and Col. A. Jacoby, both of Australia; General Lawton, Fort Monmouth CO and Col. F. E. Kidwell, Signal Officer for 1st Army.

General Back, Chief Signal Officer, accepts from Brigadier Molloy, Australian military attache to U.S., plaque of friendship for the Signal Corps on behalf of the Royal Australian Corps of Signal. Description of proceedings was carried via Army communications network to Melbourne, Australia.

Astronomy

By Charles DeVore

After you have talked with some of the scientists at the Naval Research Laboratory working in radio astronomy, you might be convinced, in your own mind at least, that the man in the moon is definitely a radio amateur. (You will have to decide for yourself whether or not he is tied in with MARS.)

Radio astronomy, then, is concerned with the study of the strength, direction and variations in radio emissions from the sun, moon, and stars. These heavenly bodies are continually sending out electromagnetic energy waves toward the earth. But the ionosphere, which acts as a blanket for radio waves from the earth, is also "opaque" to these radiations from outer space, except for two "windows". One of these is in the visual part of the spectrum and this is the window that the classical astronomer uses, always with the provision "weather permitting".

The second "window" is in the short-wavelength radio range — the band from several millimeters to 30 meters, corresponding to radio frequencies between about 50,000 megacycles to 10 megacycles. Radio astronomers look through this second "window" with their radio "telescopes".

Just as the astronomical telescope uses a concave optical mirror for focusing light waves, so the radio telescope makes use of a large concave metal reflector and a directive radio receiving antenna. The beam of this antenna should be narrow enough to achieve high gain and resolution. Thus, when the axis of the beam is pointed at the sun, the radiation is presented to the radio receiver, which takes the place of the eyepiece in the classical telescope. This receiver is commonly a modification of the conventional superheterodyne circuit, but sensitive enough so that the radiations from outer space could be listened to. For evaluation purposes, however, the output of the second detector is fed to a recording milliammeter after passing through a d-c amplifier.

Although the light waves and radio waves are both electromagnetic in nature, they differ in wavelength and in behavior. It is well known that infrared rays penetrate haze much better than do light waves. Radio waves show the same tendency but in much greater degree; with them we can not only "see" easily through rain, clouds and fog—and thus use radio telescopes in any weather—but also through huge patches of dust which are present in interstellar space. This interstellar "dust" is impenetrable to light waves, as is evident from photographs of apparently coal-black patches along the Milky Way. Radio waves, however, are reflected or absorbed by ionized gases which may be transparent to light. The earth's ionosphere is a good example of this characteristic. Although quite invisible, it is responsible for all radio communication over long distances. This characteristic is of particular importance in radio astronomy, since the outer atmosphere of the sun, for example, is highly ionized. Unlike light waves, the shorter radio waves have greater penetrating power than the longer ones, which are reflected by the ionosphere.

But the longer wavelengths of radio, as compared with light, impose a problem for the radio astronomer, since they make it difficult to obtain the resolution that can be obtained with the astronomical telescope. At the Naval Research Laboratory, this problem has been attacked by using larger diameter reflectors and microwaves. This year, NRL put in operation a 600-inch radio telescope. This installation consists of a 50-foot diameter paraboloidal aluminum reflector, mounted on a modified Navy five-inch gun mount which will aim the reflector at any point in the heavens, and radio receiving equipment with the necessary sensitivity. An axis converter corrects for the earth's rotation and permits the reflector automatically to "track" the sun. The radio telescope can be controlled manually or slaved to a five-inch astronomical telescope by remote control. If desired, the system can also be controlled manually at the mount itself. The reflector was machined to a tolerance of 1/32 of an inch and the antenna has an attainable gain of

THE AUTHOR

Charles DeVore received his degree in Electrical Engineering from the University of Nebraska where he also did some work in journalism. From 1936 to 1942, Mr. DeVore was an assistant editor with McGraw-Hill Publishing Company, and from 1942 to 1950 was a technical editor with the Army Signal Corps at Fort Monmouth. By 1950, he was made chief of the Requirements and Standards Branch of the Signal Corps Publications Agency. Since April, 1950 he has been assistant technical information officer at the Naval Research Laboratory.

over a million. The system was designed for operation at 3, 10, and 30 centimeters, but the scientists have been pleasantly surprised at the encouraging performance already achieved at 0.85 centimeters.

It is hoped that the high sensitivity and directivity obtained with this installation will permit the NRL observers to distinguish between different areas on the sun, and thus, for example, to study sun spots and hydrogen "flares." These same characteristics are also expected to permit detection of galactic radiation at 30 centimeters. Solar radiations have previously been detected at these and shorter wavelengths, but galactic radiation, to date, has not been detected at wavelengths shorter than 10 centimeters.

Why is the Navy, and particularly, the Naval Research Laboratory interested in radio astronomy? Well, basic research is one reason. Part of the Laboratory's mission is to conduct "fundamental research in anticipation of future requirements." The program of radio astronomy at the Laboratory seeks to extend man's knowledge of the universe, through study of such problems as the composition of the sun's atmosphere; times and nature of radio emissions from the sun, moon, and the stars; cause and nature of solar outbursts or "flares."

Such information is expected to have *practical* application in improving long-range radio communication. Solar flares, for example, are known to interfere with radio communication, but complete knowledge of why this is so is lacking. Since the sudden increase in solar emission responsible for radio-communication fadeouts is related to equally sudden increases in centimeter-wave emission from the sun, this study may lead to a more efficient use of radio-communication channels. Ultimately, the scientists hope to be able to predict the occurrences of ionospheric disturbances and magnetic storms. And this application of new basic knowledge would benefit the communication industry as well as the Armed Forces.

The study of radio astronomy was begun at the Naval Research Laboratory in 1946, under the direction of Dr. John P. Hagen, as a new phase of its investigation into electromagnetic wave propagation and related meteorological phenomena. Unlike radar, radio astronomy was not "born" at NRL. Back in 1894, Sir Oliver Lodge suggested that radio waves might be coming to the earth from the sun. He based this suggestion on the theory—new in his day—

Dr. John P. Hagen (left) and Dr. E. O. Hulbert, director of research, NRL, stand in front of the 8mm radio telescope used for the first time in Khartoum, Sudan during the total solar eclipse on February 25, 1952.

that radio waves, heat, light, and X-rays are all different forms of electromagnetic waves. If light and heat came from the sun, he argued, why not radio waves? Furthermore, if more heat and light comes to the earth from the sun than from all the rest of the stars put together, why shouldn't this also be true for radio waves? But his attempts to detect the radio waves were unsuccessful because his equipment was crude.

Karl G. Jansky of the Bell Telephone Laboratories first detected cosmic radio radiations in 1931, using a frequency of 20.5 mc, but he found they came from the Milky Way, rather than from the sun. This scientific discovery, incidentally, like so many others, was accidental rather than intentional. What Jansky was really trying to find out was the source of the atmospheric radio noise that was interfering with transoceanic radio telephony.

In 1939, Grote Reber studied galactic radio waves with a large radio telescope that resembled some of the radar gear used in World War II, at 160 mc and at 480 mc in 1946-47. At this later time, scientists in England made observations at 64 mc. All three studies showed radio waves originating from the sky cluster in or near the plane of the Milky Way. But none of the radio signals of greatest intensity came from the direction of the bright stars, suggesting to the observers that they might originate in interstellar space.

Using more sensitive receivers than Jansky had, G. C. Southworth, also of Bell Telephone Laboratories, detected solar radiation in 1942, using a frequency of 3,000 mc. His investigations indicated that the sun's radio radiation, like its light, were more or less constant.

Perhaps this is a good place to digress for a moment to discuss the sun and solar emission. According to our present knowledge, the sun is not solid, but is a ball of highly ionized gases. The visible portion that we usually refer to as the sun, or the sun's disk, is called the photosphere. Surrounding the photosphere is the chromosphere which extends out an additional 6,000 miles or so. Beyond the photosphere is the corona which reaches out perhaps a few million miles from the sun's surface or from the photosphere. Since the shorter radio waves have greater penetrating power, the higher the radio frequency the farther the radio astronomer can look into the sun's atmosphere.

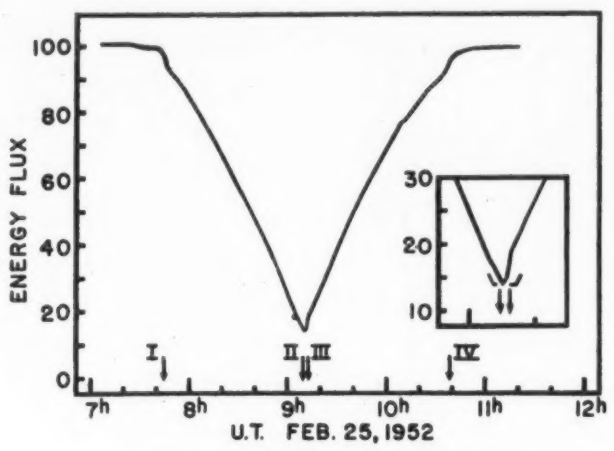
To quote Dr. Hagen: "The present state of our knowledge of the sun as a radio emitter is that the basic emission is thermal and originates in the chromosphere and corona, the longer wave lengths coming from the outer regions and the shorter wave lengths from deeper in the chromosphere. This is not because the longer waves are generated solely in the corona, whereas for the shorter waves the corona is reasonably transparent. The opacity increases with depth and a region deeper in the chromosphere will be opaque to centrimeter waves."

As a result of the tremendous advances in radio techniques during World War II, it was possible to build more sensitive radio receivers for use in the microwave region. In the Spring of 1946, a ten-foot diameter paraboloidal antenna and mount was converted at NRL for solar emission studies at a wavelength of 3.2 centimeters (9,375 mc). By July of that year, a modified standard superheterodyne receiver was completed which measured solar emission at that wavelength. It was discovered that the sun's emission at that wavelength was *not* constant, but varied from day to day and that this variation was apparently related to sunspot activity in some fashion. Using this equipment, the equivalent "black body" temperature of the undisturbed sun was estimated at 15,000 degrees Kelvin. By "undisturbed" sun, the radio astronomers have in mind the sun, or that portion of it, free of sunspots.

During the Fall and Winter of 1946, a chopper-type microwave radiometer system was constructed at 3.2 centimeters to replace the superheterodyne receiver mentioned above. This equipment is more sensitive and more stable than the superheterodyne at centimeter wavelengths because (1) th elarge fluctuation noise inherent at very low frequencies is canceled out by a modulation scheme used in the radiometer, and (2) the use of a 30-cycle modulation channel makes it possible to stabilize the gain of the amplifier system without degenerating the 30-cycle signal (which is proportional to the r-f input). These considerations are particularly important when crystal mixers are used at centimeter wavelengths. This equipment, mounted on a modified hand-operated gun mount has been in daily operation since the Spring of 1947. As this mount is not automatically controlled, only a few readings are made daily on the sun, moon, and sky. The sky reading, arising largely from the thermal emission of the terrestrial atmosphere, is used only as a secondary reference level for checking receiver performance.

During the Spring and Summer of 1948 apparatus for measuring the radiation from the sun at 8.5 millimeter wavelength was constructed and put into operation. The antenna is a ten-foot diameter paraboloidal reflector of cast aluminum, machined to a tolerance of 0.003 inch. The antenna has a beamwidth of 0.2 degree, and thus the whole pattern falls on the sun. The receiver is a superheterodyne with a 30-megacycle i-f amplifier having a bandwidth of 1 megacycle. A 1N53 crystal detector is used with a QK141 klystron local oscillator. The noise figure of the receiver is 20 decibels. A series of measurements on the sun using this equipment has revealed that the sun has an equivalent temperature, at 8.5 millimeters wavelength, of about 7,000 degrees Kelvin and does not vary to any marked degree with sunspot activity. With this sharp beam equipment, however, it has been possible to observe regions of enhanced emission believed to be associated with spot groups.

Daily readings of solar emission at 3.2 centimeters vary over a range of about 2 to 1, the variation being related to sunspot activity. Total spot area and where the spots are located on the disk are examples of factors which seem to have a bearing on emission activity. On July 29, 1948, a solar burst of emission at 9500 megacycles was observed at the Laboratory and simultaneously a bright chromospheric solar flare was observed at the Naval Observatory in Washington, D. C. This is the first such coincidence reported above 3000 megacycles.



SOLAR ECLIPSE CURVE, λ=9.4 cm

During 1951, the solar radiation at a wavelength of 3.15 cm was recorded continuously throughout each weekday. The significant results of these measurements were to accumulate the daily levels of solar radiation which are correlated with solar activity and to measure the time and amplitude of the radio outbursts from the sun. The outbursts are compared with solar flares, sudden ionospheric disturbances, radio fadeouts, and radio outbursts measured at other frequencies. The number of outbursts measured at 3.15 cm wavelength averaged ten a month from March to July and three a month from July to January. From May to October the solar radiation at 0.85 cm wavelength was recorded through the daylight hours with the significant result that five outbursts of radiation were detected. The time of occurrence of four of these bursts coincided with observed solar flares. This is the first reported detection of bursts of solar radiation at very short wavelengths.

Although radio emission data. analyzed since 1947, show a definite relation to sunspots, sunspot cycles have a ten-year period, so this study will have a few years to go. If it becomes possible to establish a definite correlation and to forecast when such solar flares are likely to occur, it will then became possible for radio communicators to arrange their operations accordingly.

Radio emission from the moon has also been observed at various lunar phases since 1947 at 3.2 cm, using the ten-foot paraboloidal reflector and the Dicke-type microwave radiometer. Difficulty in obtaining accuracy of measurements has been encountered, but evidence indicates that at this frequency the lunar radio emission variation is only a small fraction of the total heat emission variation during a lunar eclipse or during a complete lunation—the period between successive new moons.

NRL scientists have also used radio astronomy to measure solar emission during eclipses. During the total eclipse of the sun on May 20, 1947, measurements were made aboard a destroyer escort in the South Atlantic Ocean. Two significant facts were shown: (1) the intensity of radiation during totality was 4 percent of the unobscured sun's radiation, and (2) the eclipse curve is asymmetrical about midtotality, which can be accounted for in terms of asymme rical distribution of active regions on the solar disk.

The total eclipse of the sn of September 12, 1950, was observed by an NRL expedition to Attu, Alaska. Measurements were made at 0.85 cm, 3.14 cm, 10.7 cm, and 64.5 cm. This data was desired for confirmation of the theoretical model of the sun's atmosphere.

A group of fourteen people, eleven from the scientific staff of the Naval Research Laboratory and three from the High Altitude Observatory of the University of Colorado under contract to NRL, journeyed to Khartoum, Sudan, to perform six experiments during the solar eclipse of February 25, 1952. The 10-cm radio telescope measured the solar emissions in this wavelength and gave information about the density and temperature of the corona regions in which t he emissions originate. The 8-mm radio telescope gave data on the temperature and density of the inner corona and chromospheric re-

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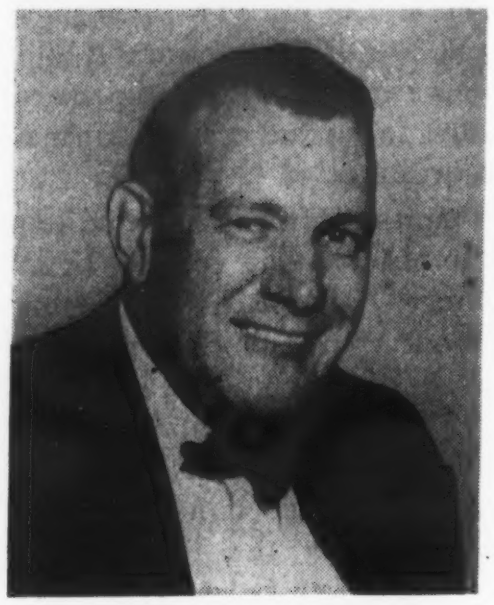
From the President



The necessity for fullest cooperation between the Armed Servics and Industry is the theme of President Watts' message. He stresses Industry's responsibilities in the partnership in this letter, and will cover the part played by the Armed Forces in the next issue.

One of the objectives of AFCA as set forth in the Chapter Guide is the endeavor "to maintain and improve the cooperation between the Armed Forces and Industry in the design, production, maintenance and operation of communications, electronic and photographic equipment in time of peace as well as in time of war . . ."

Nothing will do more to foster this cooperation than an adequate understanding of each other's viewpoints and problems. In this message I want briefly to consider Industry's part in this relationship.

Government procurement is conducted under basic legislation passed by the Congress, amplified into regulations prepared by the Department of Defense, and interpreted at operating levels by the Procurement Offices. Throughout this chain of authority precedent and tradition operate, as well as the inherent interests of each of the many organizations involved. Further, Contracting and Finance Officers are frequently called to account for their actions in much greater detail than Industry customarily requires. While many of us are aware of these facts from daily contact, their wider appreciation throughout Industry should prove most helpful.

The uncertainties that the Services face until and if hostilities develop is another fact that is sometimes overlooked. Military planning is predicated on a series of hypothecated situations. As these develop there are changes in requirements which result in changes of model, and a search for perfection, even in small details, that may be the difference between success and failure in the test of combat. An understanding of these factors when they occasionally interfere with the productive process should do much to smooth out the rough spots when the going is tough.

Finally, the vast body of techniques, both of design and of production, developed by Industry for commercial use can be of great assistance to the Services in getting the finest military gear in the world, in the quantities required, and at a price consistent with the capabilities of the National economy. I urge all in Industry to promote the adaptation of these techniques to Military use wherever possible so that we may all gain the maximum advantage from this great reservoir of technical knowledge.

For a graphic description of what production meant for two countries in World War II, you may want to consult Chapter VII of Chester Wilmot's recent book "The Struggle for Europe."

I want to devote a later message to the Military side of the relationship we are considering here. Meantime, I hope that each of our Local Chapters gets off to a flying start on the Fall and Winter Season with the advent of October.

Association Affairs

1952 AFCA-ROTC AWARDS

Listed below is the continuation of the ROTC cadets who were awarded AFCA medals at the close of the 1951-52 academic year. Due to space limitations, it was not possible to report all the winners in the July-August issue of SIGNAL. There are more winners to be reported in the November-December issue.

James W. Jarvis, Jr., Oregon State College, AFCA gold medal.

Fred Terrill, Jr., Oregon State College, AFCA silver medal.

Gordon Roy Woodcock, Oregon State College, AFCA bronze medal.

Paul H. Troutman, Princeton University, AFCA gold medal.

C. D. Watson, Southern Methodist University, AFCA gold medal.

Dick A. Webster, Southern Methodist University, AFCA silver medal.

Oregon State College

James W. Jarvis, Jr., SigC—gold medal. Cadet lt. col.; engineering major. Pershing Rifles, Scabbard and Blade.

Fred Terrill, Jr., Navy—silver medal. Petty officer third; electrical engineer.

Gordon R. Woodcock, AF—bronze medal. Cadet cpl.; mechanical engineer; won scholarship as one of two highest freshmen aeronautical engineers; Phi Eta Sigma; Tau Kappa Epsilon, Camera Club.

Pennsylvania State College

Joe O. Replogle, Navy—gold medal. Scabbard and Blade; NROTC band, radio club and rifle team; Eta Kappa Nu, Tau Beta Pi, Sigma Tau; Navy Quarterdeck Society.

Paul L. Miller, Sig—silver medal. Commander, Pi Tau Pi Sigma; Am. Society of Mechanical Engineers.

William D. Craven, Navy—bronze medal. Navy Quarterdeck Society; Freshman Honorary Society.

Princeton University

Paul H. Troutman, Navy—gold medal. Midshipman lieutenant; electrical engineering; now on active duty on USS CHARLES H. ROAN.

Purdue University

Richard E. Siegel, Navy—gold medal. Now on duty on USS HANSON.

Donald E. Colvill, SigC—silver medal. Cadet 2nd lt.

John C. Adams, SigC—bronze medal. Cadet sgt.

Southern Methodist University

Clifford D. Watson, Jr., AF—gold medal. Cadet lt. col.; elect, engr.; won 1952 AIEE student branch competition for presenting paper on "Magnetic Resonance."

Dick A. Webster, AF—silver medal. Cadet capt.; elect. engr.; student council; varsity swimming team; Phi Gamma Delta.

William L. Crawford, AF—bronze medal.

Tennessee Polytechnic Institute

Lew W. Norton, SigC—gold medal. Electrical Engineering Club, Gryphons Club, Anglers Club; veteran with 2 years' service in Army.

Paul B. Fancher, SigC—silver medal. Distinguished military student; Accounting Club.

Robert A. Graves, Jr., SigC—bronze medal. Member Rebel Rifles (honorary ROTC fancy drill platoon); Accounting Club.

Texas College of A&I

Milam G. Simons, SigC—silver medal. Cadet capt. and company commander of Signal battalion.

William F. Cowart, SigC—bronze medal. Cadet m/sgt. and battalion sergeant major.

Texas Technological College

Edward C. Cheadle, SigC—gold medal. Cadet 2nd lt.

James R. Relyea, SigC—silver medal. Cadet sgt. 1/c.

Billy R. Colvin, SigC—bronze medal. Cadet cpl.

Union College

Robert W. Morgan, AF—gold medal. Cadet col.; elect. engr.; veteran 2 years' service with Navy; president, radio club; chairman, student branch AIEE; staff of WRUC, campus radio station.

Leonard A. Staskelunas, AF—silver medal. Cadet capt.; veteran 2 years' service with Navy; AIEE, Newman Club.

Nelson Botsford, AF—bronze medal. Cadet sgt.; elect. engr.; AIEE; radio club; on staff of campus radio station.

University of Arkansas

David T. Harrel, SigC—gold medal. Distinguished military student; Blue Key, Scabbard and Blade; president. Lambda Chi Alpha.

Glen T. Feilke, SigC—silver medal. Distinguished military student; Signal battalion commander; Scabbard and Blade; ROTC rifle team.

Robert V. Dunlavy, SigC—bronze medal.

University of Colorado

Charles H. Dodson, Jr., Navy—gold medal. Elect. engr.; battalion commander.

University of Detroit

Charles M. Nakamura, AF—gold medal. Cadet lt. col.; elect. engr.; Tau Beta Pi, Eta Kappa Nu, AIEE, IRE.

University of Kansas

Duane E. Dunwoodie, Navy—gold medal. Elect. engr.; president, Tau Beta Pi; Sigma Tau, Eta Eta Kappa.

Edward C. House, Navy—silver medal. Engr. physics; Tau Beta Pi; Sigma Tau.

Jimmy Simmons, Navy—bronze medal. Engr. physics.

University of Kentucky

John A. Biggerstaff, SigC—gold medal. President, Sigma Pi Sigma; Pi Mu Epsilon; Phi Beta Kappa; physics major; vice pres. Pence Physics Club; Glee Club.

Stanley S. Dickson, Jr., SigC—silver medal. President, Phi Delta Theta; prés., Alpha Zeta; pres., Student Union Board; vice-pres., Lances; Keys; National Guard.

Fred L. Calhoun, SigC—bronze medal.

ROTC

Amateur radio club; Keys; Phi Kappa Tau; majoring in electronics and rocket research.

University of Louisville

Walter L. Crawford, Navy—gold medal. Elect. engr.; executive officer, midshipman battalion; midshipman lt. cdr.; pres. Triangle Fraternity; AIEE, past pres., Eagle and Anchor Society, Rifle and Pistol Club; Sigma Tau Omicron Delta Kappa.

Clarence B. Diersing, Jr., AF—gold medal. Cadet S/Sgt.; elect. engr.: ARRL; amateur radio operator; MARS Club.

Cleo P. McWilliams, AF—silver medal. Cadet S/Sgt.; chemical engr.; AFROTC rifle team; American Institute of Chemical Engineers.

University of Maine

William S. Ruby, SigC—gold medal. Chemical engr.; Am. Institute of Chemical Engrs.; Sigma Chi; Newman Club; Varsity Singers.

Glenn E. Edgerly, Jr., SigC—silver medal. Civil engr.; Theta Chi; Scabbard and Blade; ASCE; AFCA; Glee Club; won AFCA bronze medal 1951.

Robert B. Tuttle, SigC—bronze medal. Engr. physics; Theta Chi.

University of Maryland

Walter J. Davis, AF—gold medal.

Medville E. Eaton, Jr., AF—silver medal.

University of Miami

George P. O'Malley, AF—gold medal.

Harvey M. Dykes, AF—silver medal.

Tipton D. Jennings, IV, AF—bronze medal.

Unversity of Nebraska

Dean Frey, AF—gold medal. Cadet lt. col.

Robert Tockey, AF—silver medal. Cadet 2nd lt.

William H. Doole, AF—bronze medal. Cadet m/sgt.

University of New Mexico

Neal F. Current, Navy—gold medal. Elect. engr.; pres. NROTC Radio Club; amateur radio operator; pres., Kappa Mu Epsilon; vice pres.; Sigma Tau; Phi Kappa Phi; AIEE; IRE.

Charles E. Seth, AF—silver medal. Cadet m/sgt.; elect. engr.

Leonard A. Staskelunas, Union College, AFCA silver medal.

Nelson Botsford, Union College, AFCA bronze medal.

John P. Portasik, Virginia Military Institute, AFCA gold medal.

Neal F. Current, University of New Mexico, AFCA gold medal.

Leonard D. Chisholm, University of New Mexico, AFCA bronze medal.

Charles M. Williams, Virginia Military Institute, AFCA bronze medal.

Leonard D. Chisholm, Navy—bronze medal. Elect. engr.; veteran 2 years' service with Navy; amateur radio operator; past pres. NROTC Radio Club; Sigma Phi Epsilon.

University of Oklahoma

Owen K. Garriott, Navy—gold medal. Electrical engr. major.

Richard A. Elm, Navy—silver medal. Electrical engr. major.

University of South Carolina

Baden C. Duggins, Navy—gold medal. Elect. engr.; now on duty on the USS MISSOURI.

University of Washington

Oliver W. Fix, AF—gold medal. Cadet major; commander, Arnold Air Society; elect. engr.

Wayne E. Davis, AF—silver medal. Electrical engineering major.

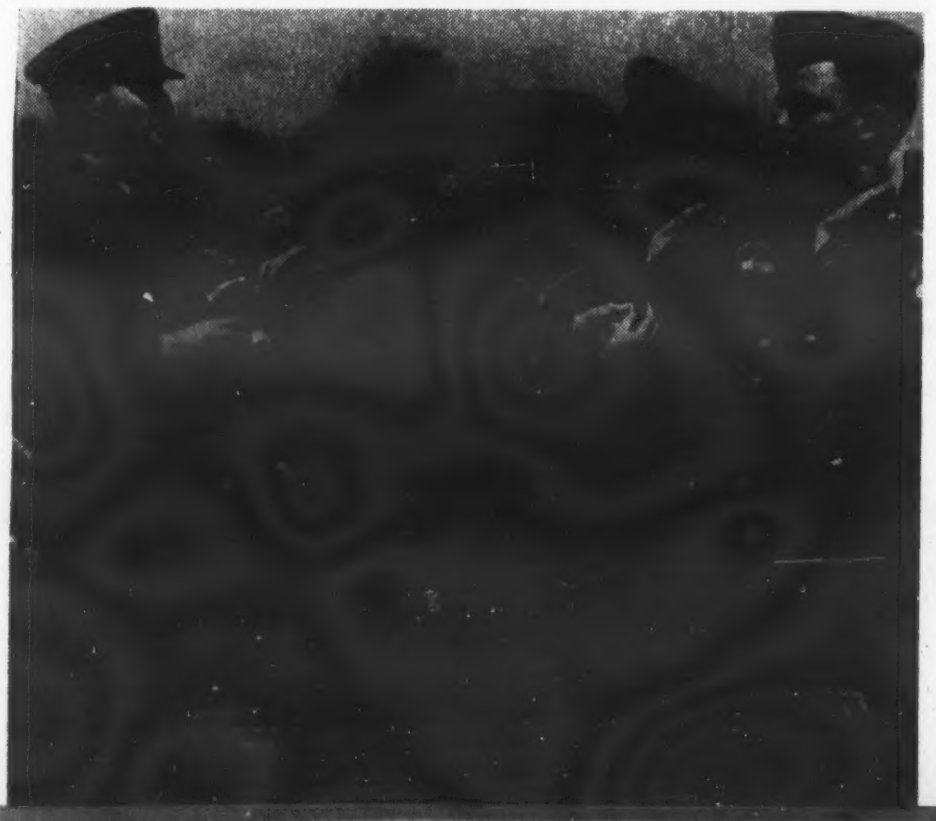
University of Wisconsin

John F. McNall, SigC—gold medal. Cadet col.; brigade commander of troops; Pershing Rifles; Scabbard and Blade; univ. rifle team; editorial staff of "Wisconsin Engineer"; AIEE; elect. engr.

Eugene E. Schultz, SigC—silver medal. Cadet m/sgt.

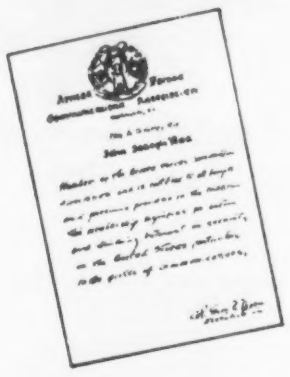
Donald L. Noel, SigC—bronze medal.

Colonel T. L. Bartlett, President of the New York Chapter, AFCA, awards the AFCA gold medal to Martin Klemes of New York University.



Roger Berry of New York University receives the AFCA bronze medal from Colonel Bartlett. Albert W. Charmatz, to Sgt. Berry's right, has just received the AFCA silver medal.

AFCA Insignia



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SIGNAL CORPS SUMMER CAMP AWARD

AFCA's annual award of a gold medal to the outstanding cadet of the Signal Corps ROTC summer encampment was presented this year to Cadet Raymond A. Proietti of Norwich University by Major General George I. Back, Chief Signal Officer. The presentation was made during closing ceremonies at Camp Gordon on July 31st.

Receiving the award because of his constant proficiency with all types of Signal Corps equipment and methods, Cadet Proietti also holds high scholastic honors at Norwich, where he is a senior and is playing his fourth year on the football varsity.

During the final week of field communications instruction at the encampment, Cadet Proietti served as commanding general of a training "division." - - - — - —

Mr. Paul V. Galvin, president and founder of Motorola Inc., was the recipient recently of a flag donated to Motorola for their patriotic defense effort by the regional sales managers of the Communications Division of Motorola, Mr. Gene Goebel, right, Motorola General Sales Manager, Communications Division, makes the presentation.

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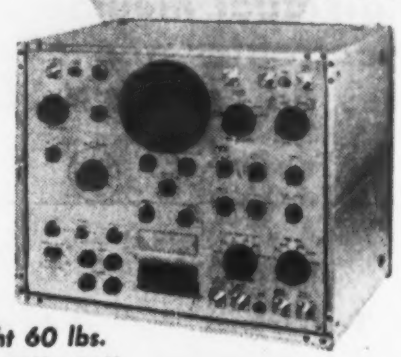

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Bell Telephone Company of Pa.
Bendix Radio
Bergsma Brothers
Bliley Electric Company
Breeze Corporation
Burnell & Company
California Water & Telephone Co.
Capitol Radio Engineering Inst., Inc.
Cargo Packers Inc.
Carolina Telephone & Telegraph Co.
Central Radio and Television Schools
Chesapeake & Potomac Tel. Co.
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Cornell-Dubilier Electric Corp.
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Crosley Division-Avco Mfg. Corp.
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Diamond State Telephone Co.
Drake Manufacturing Co.
Dukane Corporation
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Electronic Associates, Inc.
Elgin Metalformers Corporation
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General Electric Company
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Haloid Company
Hammarlund Manufacturing Co., The
Hazeltine Electronics Corp.
Heinemann Electric Company
Hercules Motor Corp.
Hoffman Radio Corp.
Hughes Aircraft Company
Hycon Manufacturing Company
Ilex Optical Co.
Illinois Bell Telephone Co.
Indiana Bell Telephone Co.
Institute of Radio Engineers
Indiana Steel Products Co.
Indiana Steel & Wire Co.
International Business Machines
International Resistance Co.
International Tel. & Tel. Corp.
Jacobsen Manufacturing Co.
James Knights Co., The
Kellogg Switchboard & Supply Co.
Kester Solder Company
Kleinschmidt Laboratories, Inc.
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Leich Sales Corporation
Lenkurt Electric Company, Inc.
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New Jersey Bell Telephone Company
New York Telephone Company
Northwestern Bell Telephone Co.
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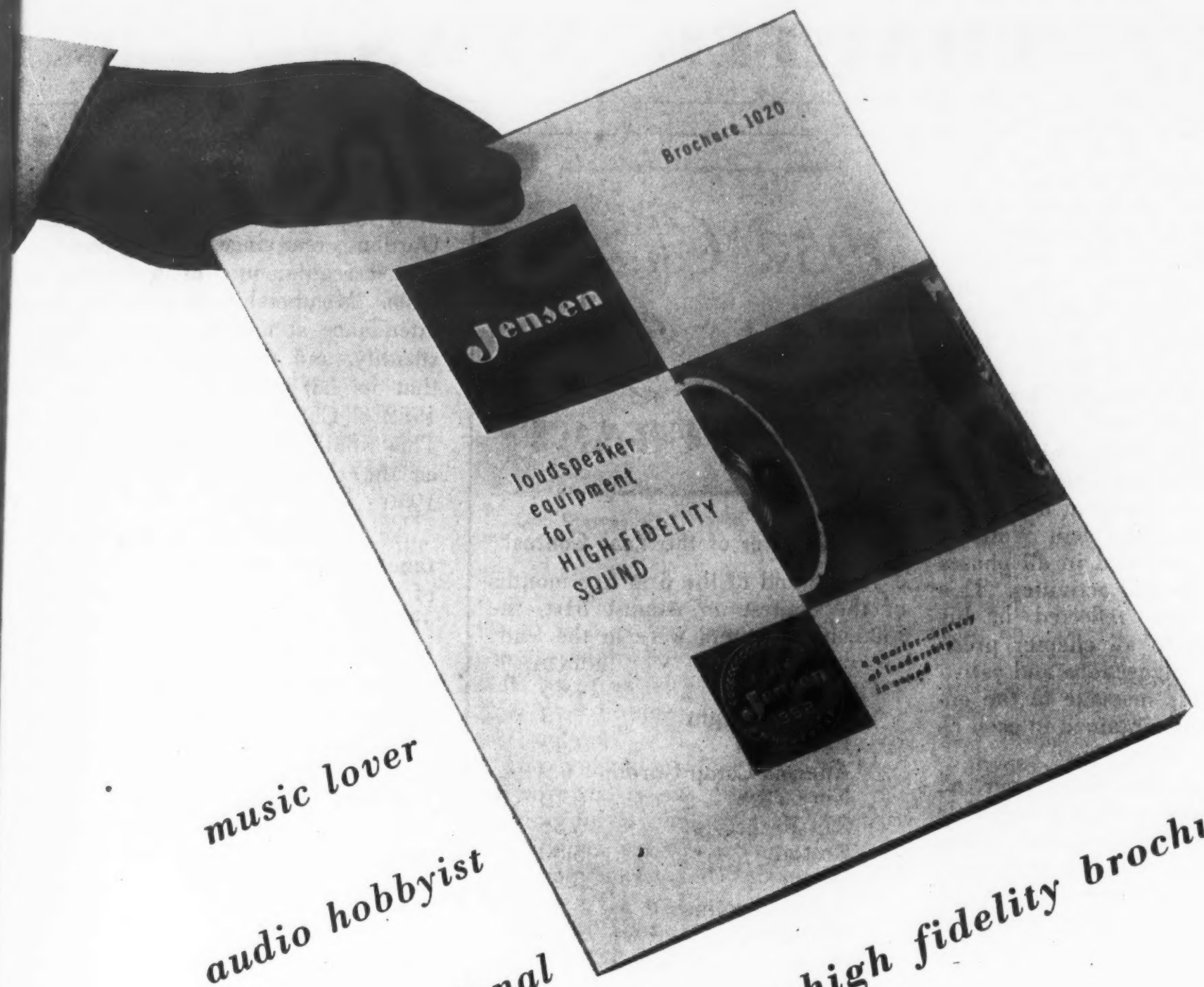
Willard Storage Battery Company
Wisconsin Telephone Company
Wollensak Optical Company
York-Hoover Corporation
Zenith Radio Corporation



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CHAPTER NEWS

The overall chapter picture reveals an interest and enthusiasm which promises a year of unprecedented activity and influence. This is due, in large part, to the keen insight into chapter affairs which Wally Watts, a former chapter president and later national vice-president in charge of chapters, brings to the AFCA national presidency this year.

Having organized the Philadelphia Chapter in November 1946 and having served as its president during its first three years, President Watts is thoroughly experienced in all phases of chapter needs and activities. This has already been reflected in his monthly letters to all chapter presidents, offering suggestions and assistance, and in his message to the entire membership contained in each issue of SIGNAL.

With the summer recess over, all chapters are now resuming full-scale activities. Program plans reported to national headquarters are particularly impressive, and membership drives in many chapters are gaining momentum.

(Editor's note to all Chapters: The *Chapter News* section of SIGNAL is *Your* section. Tell us about your activities and we'll tell everyone else.)

1952 Chapter of the Year
GULF COAST

1953 Chapter of the Year Contest

At the end of the first five months of the contest on August 31st, the following chapters were in the lead:

	POINTS
Decatur	14.45
Dayton-Wright	7.75
Pittsburgh	7.45
Augusta-Camp Gordon	6.9
New York	6.70
San Francisco	6.36
Boston	5.30
Seattle	5.27
South Carolina	5.21
Detroit	5.08

Chapters which recessed for the summer months have now resumed full-scale activities and no doubt there will be numerous changes in the above list before the contest closes on March 31, 1953.

Sacramento Chapter's June meeting featured Howard Van Zandt of Kellogg Switchboard & Supply Co. as guest speaker. L to R, Mr. Van Zandt; Col. F. T. Gillespie, CO, Sacramento Signal Depot; and Brig. Gen. A. M. Shearer, former chief of SigCorps P&D division.

Augusta-Camp Gordon

Increased interest in the AFCA has been evidenced in the August-Camp Gordon area since the chapter resumed regular monthly meetings in June. Membership is growing and attendance at meetings is increasing steadily, and the chapter announces that its hat is in the ring for the 1952/3 Chapter of the Year title. This would be a repeat performance as the chapter won the contest in 1950.

An illustrated talk on the Mediterranean countries by Col. Fred Elser of Camp Gordon featured the program of the chapter's July 31st meeting, held at the Augusta Arsenal.

Members and guests met for a pre-dinner cocktail hour at the Arsenal officers' club. Following the business meeting, Chapter President Charles Eberhart showed the slides of the AFCA national convention held in Philadelphia in April which have been touring the various chapters.

Baltimore

If the enthusiasm of its executive committee is any indication, the Baltimore Chapter is due for an outstanding year of activity.

The committee met on August 19th with the following present: George C. Ruehl, president; Lt. Col. George M. Simmons representing Col. A. H. Anderson, vice president; Col. Henry Williams, past president; Col. J. D. Dreyfus, vice president; Don C. Lee, vice president; Plummer Wiley, secretary; Albert Busch, treasurer; Clinton Johnson and Mrs. John Shipley, recording secretary.

During the three-hour session many constructive suggestions were made to stimulate interest in the association and expand the chapter's sphere of influence. The working group was enlarged to assure more complete coverage of chapter affairs. Clinton Johnson, director of public relations, State Roads Commission, and a charter member of the chapter, was appointed interim fifth vice-president. Mrs. John A. Shipley was appointed recording secretary. Committees were set up as follows: Membership—Don C. Lee, chairman; Lt. Col. George M. Simmons, co-chairman; Military Affairs—Col. J. D. Dreyfus, chairman; Coordinating — Clinton Johnson, chairman — this committee to cover

liaison, publicity, public relations and reception; By-Laws—Col. Henry Williams.

The chapter's responsibility in connection with civil defense came in for considerable discussion and it was decided to notify the Maryland Civil Defense organization that the chapter has a committee at its service. A chairman will be appointed later to maintain liaison between the state and the AFCA.

It was suggested that the appointment of an advisory council, to consist of top industrialists in the area, would be of considerable value to the chapter, and President Ruehl was authorized to explore this possibility.

Plans were made for a social meeting to launch chapter activities in the fall.

Boston

"If war takes place we will be fighting not with the weapons of today but with the weapons developed by research laboratories in the future," said Col. Howard W. Serig, Vice Commander, Air Force Cambridge Research Center, in an address before the chapter's June meeting. Col. Serig was well qualified to discuss "The Air Research and Development Command," having served as Air Force Secretary of the Committee on Electronics, Research and Development Board. Formerly a Signal Corps officer, he was at one time Director of the Evans Signal Laboratories.

Annual elections brought in the following slate: president—Paul F. Hannah, Raytheon Manufacturing co.; vice presidents — Brackett K. Thorogood, Franklin Technical Institute, and Col. James J. McKendry; treasurer — Gardiner Greene, The Gabriel Co.; secretary — Louis B. Dunham, Franklin Technical Institute. Directors—Capt. A. R. Taylor, USN; David R. Hull, Raytheon Mfg. Co.; Thomas F Halloran, General Communication Co., retiring chapter president; Col. Howard E. Price, PMS&T, Northeastern University. National council members—Edward A. Johnson, The Barry Corporation; and Arthur S. Mullins, New York Central RR.

Committee chairmen have been appointed as follows: membership—T. F. Halloran; program—Raymond B. Meader, New England Tel. & Tel. Co.; reception — William Holdich, Boston Naval Shipyard.

Cincinnati

Plans for a Cincinnati Chapter are now being firmed by Lt. Col. Ralph G. Edwards of the AT&T Long Lines Dept., who is well versed in AFCA chapter affairs having served for several years as vice-president of the New York Chapter prior to his transfer to Ohio.

The embryo chapter already has the required twenty-five members to petition for a charter. Included in this number are two group members —the Cincinnati and Suburban Bell Telephone Co. and the Crosley Division, Avco Manufacturing Corp.

A general meeting of the local membership will be held sometime in the early fall to set up the working organization for the chapter.

Lt. Col. Marcus W. Heskett, retiring chairman of the Tokyo Post, turns over the post charter to the new chairman, Maj. Thomas Buckley, at the June meeting.

Dayton-Wright

In keeping with summer hobbies, the chapter presented a lecture-demonstration on "Photography is Fun" by Joseph Fleck, manager of the local Malone Camera Stores, at its July 31st meeting. Mr. Fleck demonstrated various types of cameras, explaining the advantages and preferences of each. He also conducted a question and answer period at the close of his talk, after which the members and guests had an opportunity to inspect at first hand the equipment he had discussed.

President Paul Clark reported that the October meeting would be devoted to setting up the working organization for the 1953 AFCA convention, and that Maj. Gen. R. C. Maude, Director of Air Force Communications, W. W. Watts, AFCA National President, and Col. George Dixon, AFCA Executive Secretary, had been invited to attend the meeting and assist in the planning.

At the August 28th meeting, President Clark announced that the above guests had accepted invitations to the October meeting which would be held on the 23rd at the Officers Club of Wright-Patterson Air Force Base. John Wilkinson and Lou Herz were appointed to make the necessary arrangements.

The General Electric film ". . . And a Voice Shall Be Heard," which was

Col. William M. Talbot, Director of Warning and Communications, Federal Civil Defense Administration, addressing Pittsburgh Chapter.

Part of the record attendance at the Pittsburgh Chapter's banquet at the William Penn Hotel on June 13th.

At Pittsburgh Chapter annual meeting, L to R: Ralph Will, president-elect, E. C. Roys, NPA guest speaker, J. C. Longstreth, toastmaster, and Sylvester Stoehr, president.

filmed by the March of Time, was presented at the close of the business session. The film, which is available to all AFCA chapters, portrayed vividly the effects of a mock atom bomb attack on an American city and the part two-way radio would play in such an emergency.

Decatur

The first of the chapter's awards for recruiting additional members were made at the June 19th meeting by Lt. Col. Edwin Fritz, new executive officer of the Decatur Signal Depot. Gold lapel buttons for signing up ten members each were presented to Eldo Coffman, Lura Durbin, Lois Koshinshi and Alice Toll. A silver button for five new members was presented to James Potter.

Two interesting films, "Vera has Her Way" and "Look for the Inside Story of Television," detailing operations of various television receivers under varying conditions, were presented by Elmer Cupp, chairman of the meetings committee.

Slides covering events of the national convention in Philadelphia were shown and described by Herman Tille, chairman of the chapter's industrial relations committee.

Taking advantage of summer weather, the chapter staged a picnic on July 26th which from all reports was an event long to be remembered. The day's activities were planned to interest all members and their families, no matter what the age. A ball game in the afternoon preceded the supper, and an amateur talent show, followed by dancing to recorded music on an outdoor platform, provided the evening's entertainment. Total attendance was 600.

The picnic was held at the 101 Ranch Park, six miles out of Decatur. Tickets were 50c each, with admission for children free. Beer, soft drinks and ice cream were furnished without charge. A door prize was given to the lucky ticket-holder, and prizes were awarded to the three best performers in the talent show.

Committee members responsible for the successful outing were: Lester Carter, Chester Badgett, Willie Evans, Henry Hines, John Pellock, Herman C. Tille, E. W. Cupp, James Buck and Louis Yack. William Thomson was master of ceremonies and conducted the two-hour talent show.

During the evening, gold lapel buttons for recruiting ten new members were awarded to the following by Col. Frank Schaal, commanding officer of the Decatur Signal Depot: William Thomson, Ernest Anderson, Wayne Ashby and Willie Evans.

It was announced that Chapter President Louis Yack, during whose term the chapter has established a record for activity and membership, is being transferred to Okinawa in September. First Vice-President Roman Wojcicki will succeed to the presidency until the annual elections are held in December.

Sacramento Chapter members at the June 19th dinner honoring Col. F. T. Gillespie, Sacramento Signal Depot Commander, prior to retirement.

Far East

Members of the Tokyo Post met on June 27th and elected the following new officers: chairman—Maj. Thomas Buckley, 71st Sig Sv Bn; 1st vice-chairman—Col. Wesley E. Calkins, 1808 AACS; 2nd vice-chairman — James M. Roche, Sig Sec, Hq. FEC; secretary — Capt. Ernest E. Miller, Jr., 71st Sig Sv Bn; treasurer—Lt. Cdr. Rowan L. Scarborough, Hq. COMNAVFE.

The meeting, which was preceded by a buffet supper, was held at the 71st Sig Sv Bn Officers Club and was conducted by Lt. Col. Marcus W. Heskett, the retiring chairman of the post.

Fort Monmouth

Col. Thew J. Ice, Jr., of the Armed Services Electro Standards Agency, has been chosen to head the Fort Monmouth Chapter to succeed Col. Eugene A. Kenny who was transferred to the Far East. In line with the chapter policy of having the president and secretary closely associated to assure efficient coordination of chapter matters, C. Truman Reeves of ASESA was appointed secretary to succeed Col. Gerald F. Nagle of The Signal School.

The appointments were made at a special meeting of the board of directors on July 10th.

Kansas City

Plans for the coming season were mapped out at the chapter's executive committee meeting on August 20th. Regular chapter meeting dates were set for the third Monday of each month from September through May with the exception of December.

The first meeting of the fall will be held September 15th and will feature two speakers from the Air Defense Command. A joint meeting with the IRE, AIEE and the Missouri Society of Professional Engineers is being worked out for November.

Committee chairmen for the various phases of chapter activity are: program—Carl L. Spaid, president, United Telephone Company; membership—Col. C. S. Miller, director of communications and electronics, Central Air Defense Force, and E. E. Howard, exchange engineer, Southwestern Bell Telephone Co., co-chairmen; student activities—C. L. Foster, president, Central Radio & Television Schools.

Decatur Chapter. Membership drive awards were presented at the June meeting to, left to right, Eldo Coffman, Lois Koshinshi, Lura Durbin, Alice Toll and James Potter. Lt. Col. Edwin Fritz, far right, made the presentations. In the background are Chapter Secretary Chester Badgett and President Louis Yack.

Kentucky

"African Adventure," the technicolor sound movie of the Gatti-Hallicrafter expedition to Africa, was the program feature of the opening fall meeting of the Kentucky Chapter on September 3rd. The film was furnished by the Hallicrafters Company and is available to all AFCA chapters.

Held at the Officers' Club of the Lexington Signal Depot, the meeting was presided over by Col. Harold T. Gallagher, chapter president, and was attended by 150 members and guests.

A nominating committee for the annual election of officers in October was appointed as follows: Maj. Chester R. Doty, chairman; John A. Short, William Stacy, George Staed.

Maj. Gilbert A. Waite was appointed chairman of the membership committee, and Lt. Joseph S. Herbets was selected to serve as program chairman for the months of October, November and December.

Louisiana

New officers have been elected to head the Louisiana Chapter as follows: president—C. C. Walther, Walter Brothers Co., Inc.; vice-presidents —Dr. Joseph C. Morris, executive vice-president, Tulane University; George W. Healy, Jr., Times-Picayune; Charles Pearson, Jr., Southern Bell Tel & Tel; Rev. Thomas J. Shields, S.J.; president, station WWL; Edgar B. Stern, Jr., station WDSU-TV; Thomas A. Taylor, Western Union. Col. A. B. Hay, Southern Bell Tel & Tel, and Joseph D. Bloom of WWL were re-elected secretary and treasurer, respectively.

Plans are being made to resume activities in the fall and program regular meetings which will be of interest to the members.

Something different. The Scott-St. Louis Chapter took time out from their June 5th meeting to watch the Walcott-Charles fight on TV. They later saw a new USAF training film on Radio Antennas.

New York

A pleasant diversion in the form of a supper-picnic on June 25th termi-

Col. Lloyd C. Parsons, president, San Francisco Chapter, addressing the July 18th meeting which featured Civil Defense.

Officers of the new San Luis Obispo Chapter are, L to R, Samuel H. Boyd, treasurer; Lt. Col. Carl H. Sturies, 1st vice-president; George H. Humphreys, president; CWO William H. Angel, 2nd vice-president; WOJG Guinard H. Rydell, secretary.

nated the chapter's activities for the summer. Through the courtesy of Col. Frank E. Kidwell, Signal Officer, First Army, the facilities of the picnic grove on Governors Island were made available to the chapter members and their ladies and guests.

Contributing to the marked success of the evening were the abundance of good food and beverages, the fine music furnished by the First Army band, and the speeches which were particularly distinguished by their absence.

Chapter President Ted Bartlett announced that plans were being made for the first fall meeting on October 29th with Maj. Gen. George I. Back, Chief Signal Officer, as the guest of honor.

The chapter's membership committee, under the vigorous direction of its chairman, Don McClure of the New York Telephone Co., continued full-scale activities during the summer months with membership passing the 800 mark on July 31st.

As a promotional aid in its campaign, the committee designed a poster for use in business establishments, plants, etc., which has proved very effective. Sample copies of the poster were sent to all AFCA chapters by Executive Secretary George Dixon with the result that many chapters have enthusiastically subscribed to the idea and have ordered quantities of the poster for use in their own areas.

Philadelphia

The annual dinner-dance on June 20th ushered out a highly successful season for the Philadelphia Chapter. One hundred members and guests attended the event at the officers' club of the Philadelphia Quartermaster Depot and the cocktail hour which preceded it.

As an added attraction, colored slides of the recent annual convention, at which Philadelphia had distinguished itself in its role as host chapter, were shown by President Harry Ehle.

The results of the recent annual election were announced and the new officers installed as follows: president —Robert G. Swift, Diamond State Telephone Co.; vice-presidents .— Brig. Gen. W. P. Corderman, SigC; Capt. H. A. Ingram, USN; Lt. Col. D. L. Rundquist, USAF; R. E. Cramer, Jr., Radio Condenser Corp.; V. K. Cohen, Victor-Bernard Industries; J. D. McLean, Philco Corp.; secretary—J. P. Scurlock, Bell Telephone Co.; treasurer—J. M. Searing, International Resistance Co.

Pittsburgh

A thorough briefing on the air raid warning system was given by Col. William M. Talbot, Director of Warning & Communications, Federal Civil Defense Administration, at the chapter's May 15th meeting. AFCA members assisted Colonel Talbot in the demonstration of the bell and lights system used for sending out air raid warning alerts.

The meeting was held in the Fort Pitt Hotel and was preceded by a dinner in honor of Colonel Talbot. One hundred and ten members and guests were present.

A record attendance of over 300 marked the chapter's fifth annual banquet on June 13th which featured an address on "The Communications Industry and the NPA" by E. C. Roys, Deputy Director, Communications Equipment Division, National Production Authority.

Also appearing on the program was Earl Moore, Vice President of United State Steel Corporation, who described the "Alert America" display scheduled for a week's showing at Hunt Armory.

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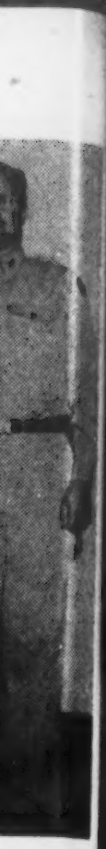

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CHAPTER NEWS

● Right: Dimitri Boria of the photographic laboratory, SigSec, Hqs. FEC, addressed a recent meeting of the Tokyo Post on the subject of color photography. Here, he demonstrates some of the processes involved in making color transparencies and prints.

● Left: "Air Traffic and Ground Control of Aircraft in Korea and Japan," was described by Maj. August C. Mahon, USAF, before the May meeting of the Tokyo Post. Maj. Mahon, shown here, is Chief of the Electronics Div., Directorate of Communications, FEAF.

National Director of Chapters: **Maj. Gen. George I. Back**

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Area C: Ralph S. Grist, So. Bell T&T Co., Atlanta, Ga., *Southeastern States along Atlantic and Gulf coasts—from North Carolina to Louisiana including Tennessee*

Area D: E. H. Mittanck, 711 Telephone Bldg., Dallas, Tex. *New Mexico, Texas, Oklahoma, Arkansas*

Area E: T. S. Gary, 1033 W. Van Buren St., Chicago, Ill. *Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, North Dakota, South Dakota, Wyoming, Colorado*

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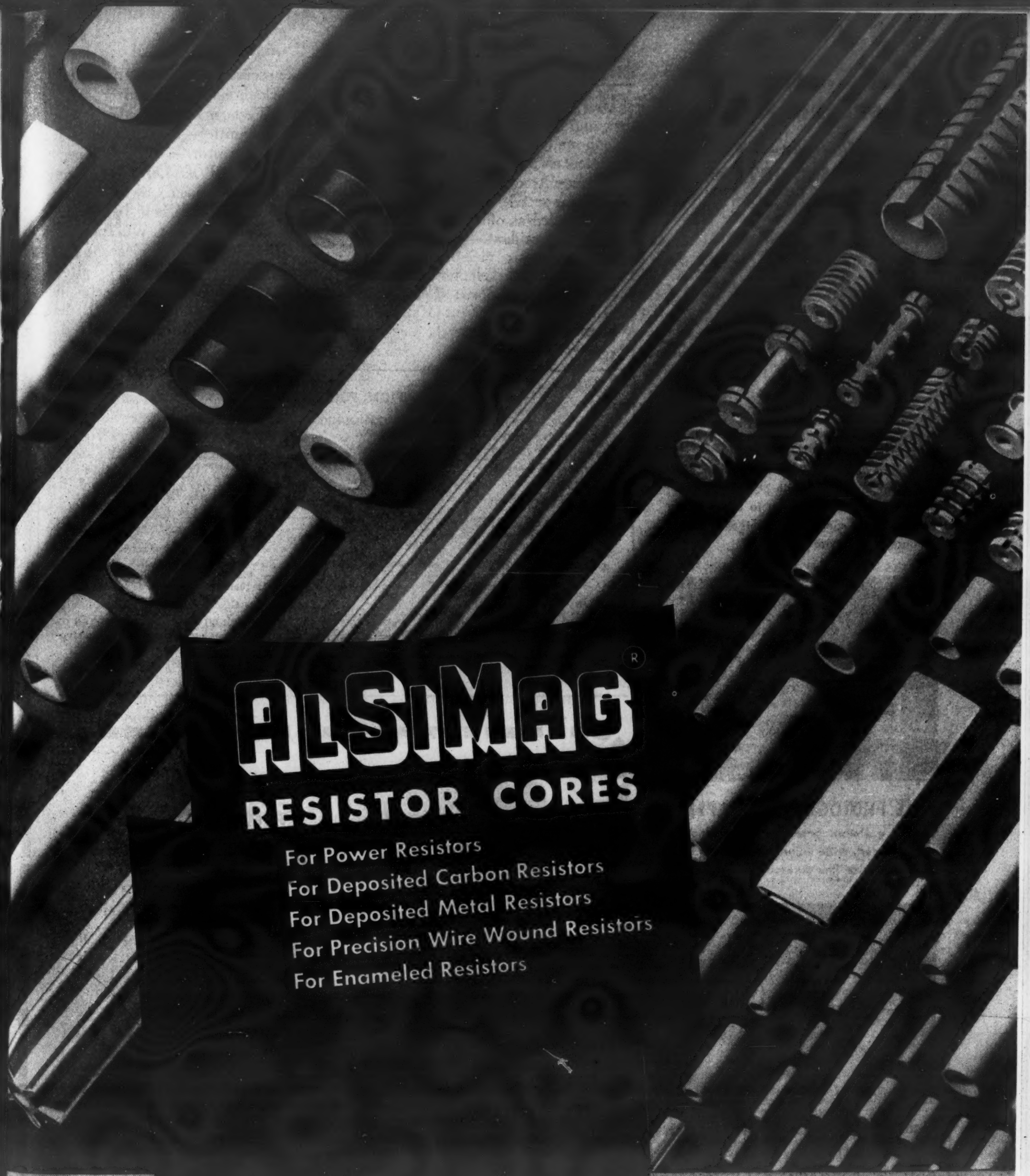

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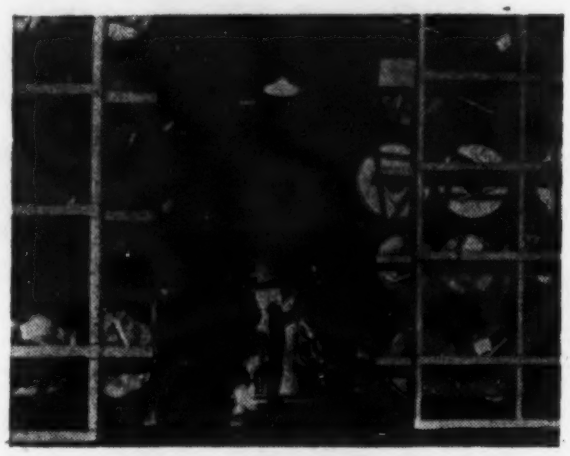

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CHAPTER NEWS

Mr. John Longstreth, Vice President and General Manager of the Bell Telephone Company of Pennsylvania, officiated as toastmaster.

The results of the annual election were announced and the following were installed as officers for the coming year: president—Ralph W. Will, Hamburg Bros.; vice-presidents—S. E. Phillips, Bell Telephone Co.; H. C. Stevens, U. S. Steel; R. J. Campbell, Bell Telephone Co.; Maj. E. G. Williamson, Asst. PMS&T, Carnegie Tech; secretary—Harold W. Mitchell, Bell Telephone Co.; treasurer—W. H. Yates, Western Union; member executive committee—S. C. Stoehr, Jr., board of directors—A. N. Galone, E. A. Hamburg, F. E. Leib, J. C. Longstreth, F. E. Moran, E. J. Staubitz.

The banquet was held in the Pittsburgh Room of the William Penn Hotel following a very pleasant social hour. Among the guests in attendance was Sally Rand who, when called upon to speak at the banquet, demonstrated her ability as a public

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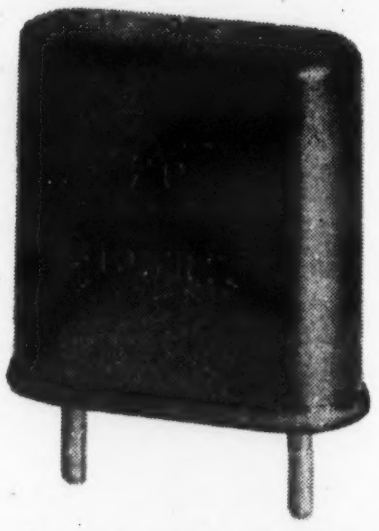

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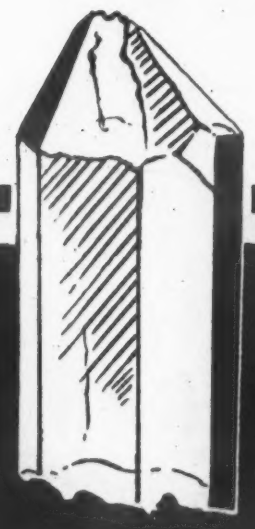

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speaker with an excellent talk on the value of the American heritage of freedom.

San Francisco

Civil defense was the theme of the chapter's July 17th meeting, with Harry Stoops, Regional Director of Civil Defense Region 3 (comprising the nine Bay Area counties of California), as the guest speaker. Mr. Stoops told of some of the accomplishments of the Civil Defense program to date and some of the plans for the future. Chapter members were impressed with the progress made during the two years the Civil Defense program has been underway.

The communications aspects of Civil Defense were explained by C. L. Wickstrom, chapter vice-president and defense activities engineer of the Pacific Telephone & Telegraph Co. With the air of a series of charts, Mr. Wickstrom explained what communications systems would be available in the event of emergency and how they would be utilized.

This was the first chapter meeting to which the distaff side had been invited, and Col. Lloyd Parsons, Chapter President, opened with a special welcome for the ladies, asking each one to rise and introduce herself. He also welcomed the representation from the Navy and Air Force, especially Capt. E. E. Berthold, Director of Communications, Western Sea Frontier, and Col. Hobart R. Yeager, Hq. 28th Air Division, Hamilton AF Base. The meeting took place at the Marines' Memorial Club, and included a social hour and dinner.

San Luis Obispo

San Luis Obispo joined the ranks of AFCA chapters on August 29th when a petition for charter, signed by 35 members, was received and approved at national headquarters.

The chapter was organized through the efforts of George Humphreys, of the Academic Department, Southwestern Signal School, Camp San Luis Obispo, who was formerly publicity chairman of the F. E. Warren-Cheyenne Chapter. The excellent cooperation extended by Brig. Gen. Harry Reichelderfer, Commanding General, Camp San Luis Obispo, and members of his staff, has been of invaluable assistance in stimulating interest in the association and its objectives.

Temporary officers have been selected as follows: president—George H. Humphreys; 1st vice-president—Lt. Col. Carl H. Sturies; 2nd vice-

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Operations can be carried out with the work in crates, or hung from hooks, utilizing an overhead rail and hoists. For large volume production, automatic equipment can be used to mechanize the line. Small parts can be treated in tumbling barrels.

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"PERMADINE" DATA CHART

Type of coating	Zinc phosphate
Object of coating	Rust and corrosion prevention
Typical products treated	Nuts, bolts, screws, hardware items, tools, guns, cartridge clips, fire control instruments, metallic belt links, steel aircraft parts, certain steel projectiles and many other components
Scale of production	Large or small volume; large or small work
Method of application	Dip Barrel tumbling, racked or basketed work
Equipment notes	Immersion tanks of suitable capacity. Cleaning and rinsing stages can be of mild steel. Coating stage can be of heavy mild steel or stainless steel.
Chemicals required	"Permadine" No. 1
Pre-cleaning methods	Any common degreasing method can be used, Alkali cleaning ("Ridosol"), Acid cleaning ("Deoxidine"), Emulsion-alkali cleaning ("Ridosol"-"Ridoline"); vapor degreasing, solvent wiping, etc., are examples. Acid cleaning may need to follow other cleaning methods if rust or scale is present.
Bath Temperature	190° - 210°F.
Coating time	20 - 30 minutes
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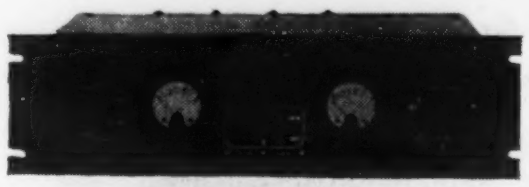

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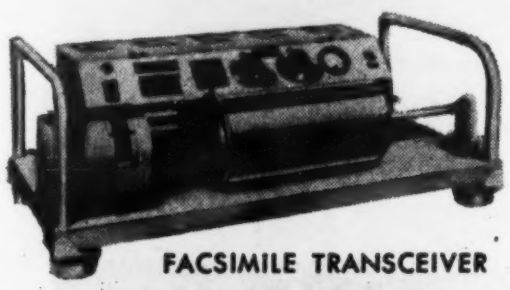

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CHAPTER NEWS

president—CWO William H. Angel; secretary—WOJG Guinard H. Rydell; treasurer—Samuel H. Boyd.

The chapter is receiving excellent publicity throughout the local area and membership is steadily increasing. Plans are being made for an outstanding meeting early in the fall.

Scott-St. Louis

The chapter's first fall meeting is scheduled for September 12th and will be sponsored by the Southwestern Bell Telephone Company, a group member of the AFCA.

Plans are also underway for a "super-special" meeting in December to celebrate the chapter's first anniversary. Publicity Chairman Howard Yund has come up with the very original idea of making slides of photographs taken at the various meetings during the past year which will be shown, with appropriate commentary, at the December meeting to refresh the memories of the older members and to inform the newer ones about the chapter's history.

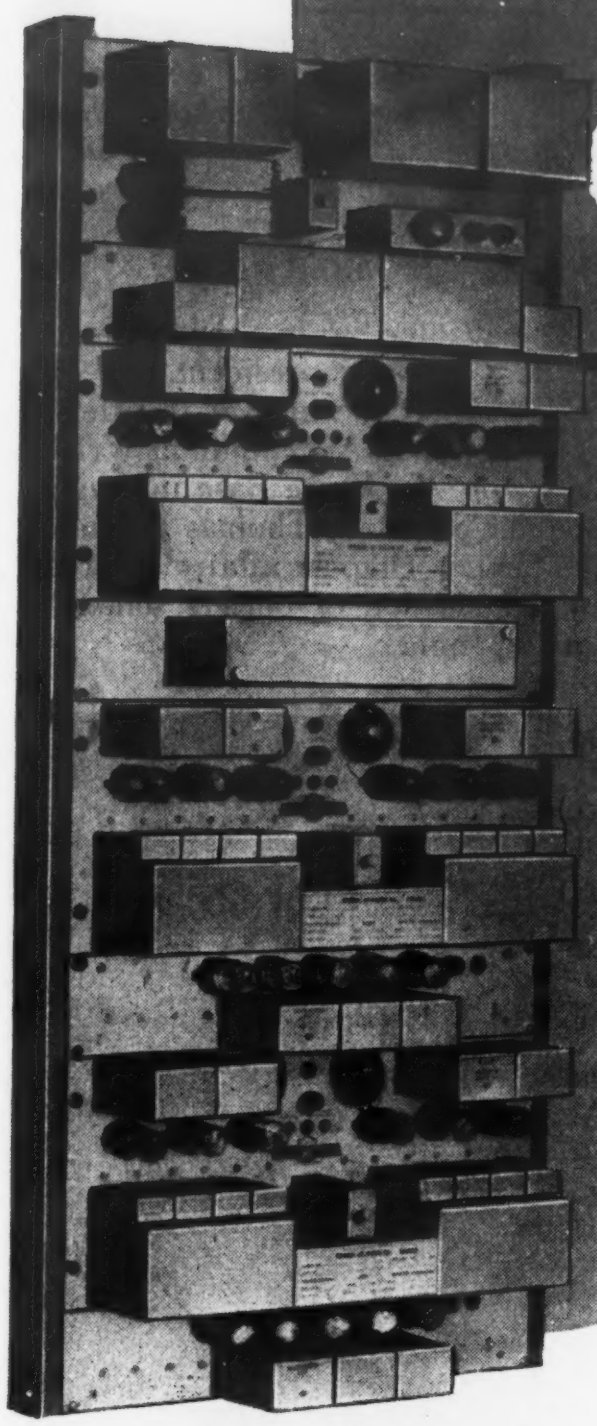
Seattle

The chapter's trip to the Navy's Jim Creek installation, scheduled for July 13th, was postponed due to construction work being done on the roads leading to the station. The trip is now planned for September 21st.

South Carolina

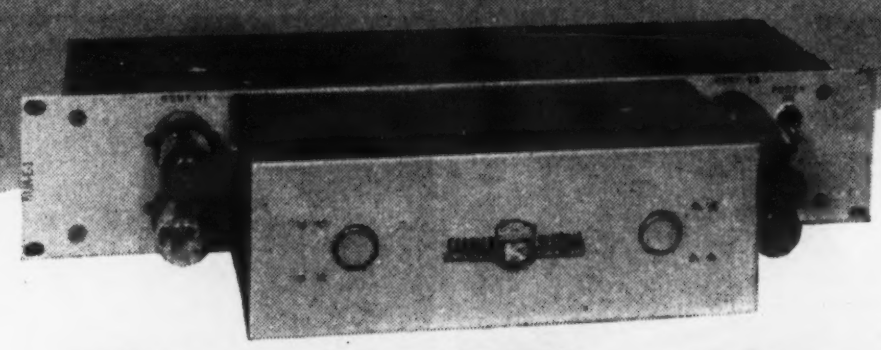
"Micro-Wave Transmission" was the subject of a lecture-demonstration by T. A. Shea, South Carolina Public Relations Manager of the Southern Bell Telephone and Telegraph Company, at the August 12th meeting of the chapter. The principles of micro-wave voice transmission were demonstrated by the use of miniature towers and other micro-wave relay equipment, and the speaker also showed some of the methods employed to bend the waves and the means by which the voice is amplified at each station. Mr. Shea was introduced to the audience by T. H. Stokes, district manager of the telephone company in Charleston.

Meeting at the officers' club of the Naval Base in Charleston, the members and guests were welcomed to the Naval installation by Capt. Henry McCarley, USN, chapter president. In order to devote more time to the program and social aspects of future meetings, it was announced that the executive committee had decided that



Cut Costs with KELLOGG Carrier

Proof that Kellogg Transmitted Carrier Systems *bat 1,000 per cent* in establishing new lows in maintenance costs is contained in the many enthusiastic endorsements received from Kellogg customers. These systems are built by *telephone* men — men who thoroughly understand the maintenance problems associated with exchange operation! Consequently, users of Kellogg Carrier Systems find that no time-consuming adjustments are required to put a carrier circuit into operation and to keep it in trouble-free, continuous service.



Now You Can Have Universal Signalling!

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NO FREQUENCY DISTORTION

Continuously free of voice distortion due to frequency shift. Speech is always clear. Voice frequencies cannot be shifted by a difference in oscillator frequencies.

NO CARRIER LEAK ADJUSTMENT

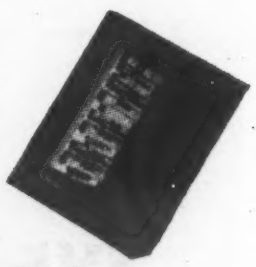
You'll have no problem with carrier leak with Kellogg Transmitted Carrier Systems—No adjustments for eliminating or minimizing carrier leak are required.

SIMPLIFIED POSITIVE SIGNALLING

Kellogg Carrier Systems may be equipped with Universal Signalling (unit shown above) which permits use in either dial or ring down service by simple strapping changes on the terminal strips.

Superiority
PROVED BY USE!

Kellogg Transmitted Carrier Systems *with Universal Signalling* have met with enthusiastic commendation wherever they have been put in service. Their superior performance is not a matter of guess-work, but *proved on the firing line in actual use! . . . KELLOGG CARRIER NOW*—AVAILABLE FROM WAREHOUSE STOCKS IN DALLAS, KANSAS CITY AND SAN FRANCISCO.



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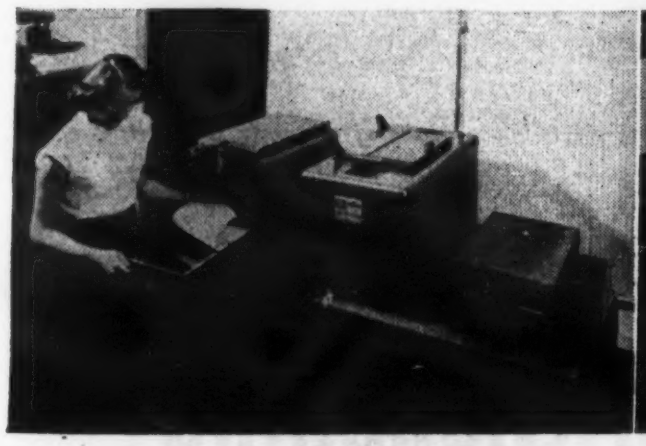
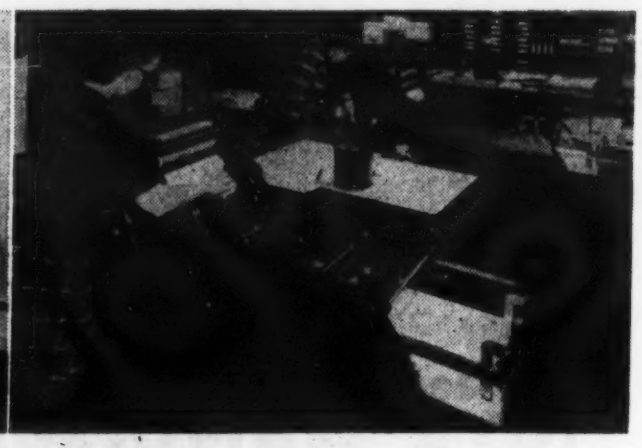
Save money! Offset metal plates cost National Gypsum Company an average of $3.10 each; an offset paper master made by xerography costs 19c! A saving of $2.91 per job in material costs alone. During the first ten months of operation, $2,467 was saved.

Save time! An offset paper master plate can be made by xerography by an office girl in less than 3 minutes. Get the facts about the amazing xerography process.



1. Photo shows operator preparing paper master with XeroX copying equipment.



2. Paper master is placed on offset process duplicator and multiple copies run off.

COMPARATIVE DUPLICATING COSTS AT NATIONAL GYPSUM CO.

NUMBER OF COPIES	FORMER METHOD	XEROGRAPHY	SAVING
10	1.00	.45	.52
25	2.50	.55	1.95
50	3.45	.68	2.77
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chapter business would be dispensed with at meetings but instead would be conducted by mail. This action met with the approval of all present.

Warren-Cheyenne

The chapter has lost the leadership of its very able president, Lt. Col. Norman Fertig, who was transferred to the 1914th AACS Sqdn. at Wright-Patterson Air Force Base in August. Chapter Secretary Thomas Rhoads is conducting chapter affairs until the annual election of officers scheduled for September.

Admiral Joseph R. Redman, Washington Chapter President

Washington

Under the direction of its new president, Adm. Joe Redman, the Washington Chapter is well on its way to another successful year of activity.

A live-wire membership committee. under the chairmanship of P. R. Watson, Washington manager of the P. R. Mallory Co., is conducting a drive among representatives of industry and the services in the nation's capital which has already boosted chapter strength to an all-time high.

The program committee is headed by J. R. B. Crigler, Vice President and General Manager of the Chesapeake & Potomac Telephone Company. Roland Davies, publisher of Telecommunications Reports, is chairman of the publicity committee.

The chapter's first fall meeting will be held October 15th in the National Press Club and will feature the Army Pictorial Service.

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NEWS

Communications-Electronics-Photography

Engineers Wasted, Says Sylvania VP

E. Finley Carter, Vice President in charge of Engineering of Sylvania Electric Products Inc., today urged the nation to take the fullest advantage of the talents and training of its engineers in order to assure continuing technical progress.

A "shameful waste" of good engineers has resulted because many members of the profession have been assigned to the handling of routine tasks instead of broad-scale planning, Mr. Carter said in an address prepared for delivery before the western convention of the Institute of Radio Engineers in session in Long Beach.

Both government and industry will pay increasing attention to in-plant training of technicians to handle many jobs that so far have been part of engineers' work, he predicted.

Therefore, the Sylvania vice president added, it is not a foregone conclusion that the present scarcity of and great demand for engineers will result in the engineering profession's gaining prestige. The contrary could be true.

"The need for engineers may become less because of reduction of rearmament work or by industry's finding some other way to take care of many of its problems," he cautioned.

To assure full usage of engineering talents, Mr. Carter called upon the profession to spread the knowledge of its achievements and potentialities.

This can be accomplished effectively through four main channels of communication: among the engineers themselves, to industrial management, to the community, and through professional engineering societies. This communication, which he termed "selling the profession," together with broadly objective planning and "enthusiasm for the ultimate objectives" of engineering should strengthen the social and economic standing of the profession.

He advised engineers to take an active part in community affairs because "by association, by example, by influence, and by real service rendered they have an excellent opportunity to enhance the prestige of their profession in the eyes of those who are not its members, as well as in the minds of the young folks who may be thus inspired to prepare for it."

Reshuffled Defense Program Anticipated

President Truman's appointment on Friday, Sept. 5, of Henry H. Fowler to head the Office of Defense Mobilization while continuing to serve as Defense Production Administrator immediately revived reports that the nation's mobilization agencies are scheduled for an early shuffling.

Mr. Fowler, who has been serving in the dual capacity of chief of the National Production Authority as well as of the DPA, told newsmen that he was resigning the NPA post and that it would be up to Secretary of Commerce Charles Sawyer to name his successor.

However, it was believed that Mr. Sawyer would, if anything, name merely an acting NPA Administrator, and that NPA would continue in its present form for only a few more months until it is changed to the status of a Commerce Department bureau.

While NPA nominally is under the direction of Mr. Sawyer's office at the present time, in practice it has been virtually a separate agency functioning with DPA and other emergency mobilization organizations.

One official predicted that when the next cut in personnel is announced for NPA, it will be accompanied with an overall reorganization of NPA divisions that was first believed imminent when Congress slashed appropriations for the coming fiscal year.

Spelling out this prediction, the official said that the various claimant agencies for industry in the NPA will "very probably disappear" as such, and that the functions of the divisions will be assumed by a NPA office having jurisdiction over a large number of industries with related or similar problems.

Opponents of such a move have pointed out, however, that by such a consolidation, the NPA divisions would lose much of their efficiency because in the claimant agencies, dealing with individual industries, personnel became acquainted with the problems of the industry they work with and are better equipped to deal with them.

However, it was pointed out several months ago, when a consolidation of two divisions within NPA's Textile, Leather & Specialty Equipment Bureau was contemplated, officials vetoed the proposal because it was intended that a later reorganization on a larger scale would be more satisfactory. This move, reportedly scheduled for the last month of this year, would set up NPA divisions handling materials, end equipment, and components, for example, and not offices that would serve as claimant agencies.

Any move, however, was expected to await the November elections. With a change in administrations scheduled, present officials are reluctant to take any large measures that would be undone after a brief period of time.

RTMA Members Get Orders for $538 Million in Government Contracts

Government orders for radio communications and related electronic equipment placed with member-companies of the Radio-Television Manufacturers' Association during the first six months of 1952 were up more than $38 million over the first half of last year, the RTMA announced last week, with January-June figures for this year amounting to $538,794,477 as compared with $503,709,882 for the same period in 1951.

During the second quarter of this year, the government placed $322,499,543 worth of orders with RTMA members, a sharp increase over the orders placed during the first 1952 quarter.

Orders for radar facilities accounted for the largest amount of money with $263,131,886 being contracted during the first six months of the year, the association reported, with orders of $160,693,327 being placed for communications equipment; $45,423,156 for radio navigational aids; $10,783,479 for Sonar facilities; $13,459,401 for laboratory and test equipment; and $45,296,101 for miscellaneous facilities.

THIS DEPARTMENT'S PRINCIPAL SOURCE

Telecommunications Reports

Roland C. Davies, Editor
National Press Building
Washington, D. C.

Meanwhile, W. M. Adams of the Sprague Electric Co., was last week named by RTMA Board Chairman A. D. Plamondon, Jr., as Chairman of the Association's 32-man Export Committee. Mr. Adams succeeds V. S. Mameyeff, of the Raytheon Manufacturing Co., as Chairman of the committee. Meade Brunet, of the RCA International Division, was appointed new Vice Chairman of the group.

Also, Mr. Plamondon reappointed A. M. Freeman of the RCA Victor Division, as Chairman of the RTMA's Tax Committee for the ensuing year, and announced an 18-man body to work under Mr. Freeman on radio-television tax problems.

Brig. General David Sarnoff (left) receives the RTMA "Medal of Honor" from Robert C. Sprague, Board Chairman of the Radio - Television Manufacturers' Association at a dinner climaxing the 28th annual convention of the Association at Chicago on June 26th.

1952 Audio Fair
Oct. 29—New York

The Audio Fair, 1952, slated to open October 29 at the Hotel New Yorker, will run for four days instead of three as in previous years, closing November 1, and will represent the greatest number of manufacturers of high-fidelity sound equipment ever to participate in a single exhibit, according to announcement of Harry N. Reizes, Fair Manager. Decision to extend the Fair's length in this and succeeding years was motivated by the fact that last year's attendance of approximately 9,000 visitors, despite unusually inclement weather, taxed the New Yorker's facilities to capacity, together with the belief that this year's attendance will be considerably greater.

Held annually in conjunction with the yearly Convention of the Audio Engineering Society, the Audio Fair is open to the public and admission is free to all persons with an interest in the reproduction of sound, hobbyists and professionals alike.

Displays include working demonstrations of the latest speakers, amplifiers and record playing equipment, as well as all the other components that go to make up sound reproducing systems. Although the majority of Fair's exhibits emphasize the ease and economy with which high-fidelity music can be achieved in the home, many displays are built around professional equipment, such as recorders and public address and broadcast systems. In view of the Fair's acceptance by the audio industry as the ideal occasion for introducing newly developed equipment, manufacturers' exhibits will feature many devices displayed for the first time for public observation.

Allied Radio New Sales Positions

Allied Radio Corporation, Chicago, announces the appointment of E. C. "Chet" Wharfield as coordinator for sales of high-fidelity equipment and Zole Csolkovits as coordinator for sales of Amateur equipment.

Chet Wharfield has been a Ham for 16 years (W9HLJ) and a member of Allied's staff for 7 years. While in the Navy he was an instructor on basic fundamentals of audio. His experience in handling high-fidelity and broadcast sales at Allied has earned him the reputation of being an audio equipment specialist. Chet, a hi-fi enthusiast who has experimented with a wide variety of home music systems, has an excellent knowledge of music.

Zole Csolkovits, very well known in amateur radio circles, has been a Ham (W1TXZ) for over 20 years. His across-the-board practical experience in electronics has made Zole a very popular consultant and trouble-shooter. "Ask Zole, he knows" is a common expression among Hams from novice to veteran. Zole is also a veteran pilot and enthusiastic fisherman, and these avocations form the subjects of many a rag-chew over the air waves.

Kentucky Colonelsy Presentation Made

Colonel Harold T. Gallagher to Germany

At a dinner honoring Colonel and Mrs. Harold T. Gallagher August 29th at the Officers' Club of the Lexington Signal Depot, Colonel Gallager received a commission as Colonel on the staff of Governor Lawrence Wetherby of Kentucky. In the absence of Secretary of State Charles O'Connell who was to have made the presentation, Mrs. Emma May Frank of Civilian Personnel Office represented Governor Wetherby.

Mrs. Gallagher, accompanied by their son, Wendell Clark Gallagher, left the Depot for San Antonio, Texas. Colonel Gallagher will remain until October, when he will leave for a new assignment in Germany.

• James H. Kellogg, president, Kellogg Switchboard & Supply Co., Chicago (center) congratulates newly-elected company Vice Presidents F. M. Parsons (left) and W. A. McCracken (right). Mr. Kellogg was recently elected president of the AFCA Chicago chapter.

"Electronic Wizardry Serves Nation's Military"

By James K. Sparkman

Reprinted from the CHRISTIAN SCIENCE MONITOR,
June 19, 1952, with permission

On the front line, an infantryman speaks into the microphone of a new hand-carried "handie-talkie" radio. His words are carried static-free as clear as a telephoned voice back to a "walkie-talkie" set strapped to the back of a company communications non-com. From there, it is relayed—if need be—to a vehicle set, from there to an even larger transceiver, and, eventually, perhaps, to the Pentagon in Washington.

At sea, a Navy ship is receiving a radioed diagram of repairs that are to be made to its helicopter to insure its safe operation. The plan was drawn up by engineers half way around the world only a few hours before.

On a hill, a new-type antiaircraft cannon crew is alerted by the drone of planes overhead. They spring to their posts, and quickly load shells into racks. The cannon swings skyward, pointing just ahead of where the planes now are. A gunner pulls the firing lanyard. But, nothing happens. Why? Because the electronic controls that guide the elevation and direction of the gun, and at the same time set the shells to explode at a given height, know that the planes overhead are friendly, even though they were not identified by the gun crew.

These examples are not day dreams, but present possibilities, either now in use or now in production stages. They have come as the result of two factors: improved design, as drawn up by civilian and military communications and electronics experts and, secondly, by retooling of industry and retraining of electronics manufacturing personnel so that these designs can be turned out on a production-line basis.

How this has happened, is of course, a story that is as broad as the entire electronics industry throughout the world. Skills learned in radio design and manufacture in one decade become the foundation for radar and "proximity fuse" manufacture later, which in turn, are the stepping stones for television and new communications devices still later.

However, one thing is apparent, that the closer the cooperation between manufacturers, and between civilian and military specialists working in the same or related fields, the faster the nation and its electronics industry will move ahead.

It is not surprising that this has been recognized by the parties concerned, and that they now meet in an association where Army generals set alongside Navy admirals or Air Force communications specialists, and that all three rub shoulders with a telephone-company president or a college student majoring in some field of communications.

The organization is the Armed Forces Communications Association, and, according to its members who are engaged in electronics manufacturing, it forms a vital link in keeping them in touch with other specialists, and with late developments in their field. Information about the "sky-sweeper" antiaircraft cannon, cited above, was revealed to the public in an address at one AFCA meeting.

Dating back to World War I, the AFCA has grown to a nationwide organization of more than 6,000 members, nearly 200 "group" memberships by firms such as Eastman Kodak Company, RCA, Gray Manufacturing Company, and Southern Bell Telephone & Telegraph Company, and to 35 active chapters which in 1949 held over 150 meetings.

Backed by top men in military and civilian electronics, the AFCA is "a patriotic, educational and nonprofit society of American citizens dedicated to military, scientific, and industrial preparedness with no commercial or political interests," says Col. George P. Dixon (retired), AFCA executive secretary. National president of the AFCA is W. Walter Watts, and RCA-Victor vice-president.

The association, Colonel Dixon continues, "endeavors to maintain and improve cooperation between the Armed Forces and industry in the design, production, maintenance, and operation of communications, electronics, and photographic equipment in time of peace as well as in war." Preservation of the spirit of fellowship among former, present, and future service and industrial personnel in the field, he says, is another goal, as is a continuing study of schools throughout the country which have training facilities in electronics and communication.

Colonel Dixon is also the editor of the AFCA bimonthly magazine SIGNAL, read by 25,000 to 30,000 persons and considered tops in its field, and a monthly news letter sent to AFCA members. In both, news of personnel in the industry, as well as descriptive material on new equipment and the companies producing it are included.

The work of the AFCA in helping to interest the best qualified youth in the communications field is indicated in a letter from Maj. Gen. George I. Back, Army Chief Signal Officer, to Paul F. Hannah, secretary and general counsel for Raytheon Manufacturing Company, and newly elected president of the AFCA Boston chapter.

"One of our continuing problems is to dramatize for the public the importance and complexity of military communications. Far too many, I fear, take for granted our communications and related electronics facilities . . .

"We have not fully succeeded in acquainting the public with the tremendous research, development, and engineering problems that we have to solve daily in order to provide our military forces with communication systems finer than that of any other Army in the world. . . .

"Explaining the role of modern communications in national defense to the people in your area would be extremely valuable."

Like AFCA members who formed their society to preserve and build on the lessons learned in World Wars I and II, military communications experts realize that industrial know-how and research cannot be tucked away in "moth balls" like aircraft carriers, to be brought forth in times of need.

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UNISTAGE

Of considerable interest to the electronics field, and particularly to the design engineer is the development of UNISTAGE by Technical Development Corporation, Culver City, California. Unistage is a unit assembly designed to self-contain all those components necessary to a functional circuit, in such a manner that the unit may be plugged into an electronic device. Four sizes of Unistage are available, whereby any combination of from 1-tube to 4-tube circuits may be utilized. There are numerous advantages in such a consolidated functional circuit:

(1) "Out-time" of a device is reduced, as a defective unit can be located quickly and replaced with a new Unistage within minutes; (2) the water-tight sealed container protects the internal components from the effects of changes in temperature or humidity, and from damage in handling; (3) heat dissipation is greatly facilitated by the black anodized housing and cooling fins; (4) in the development of new equipment, each circuit can be worked out independently and the self-contained circuit package be produced long before the final design is complete; (5) because of the use of the modulus principle in its design, maximum efficiency and space conservation is obtained in a product involving complex circuitry; (6) the Unistage unit can be serviced at one source, eliminating the stocking of multiple parts by groups in the field.

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Leader
IN PRODUCTION

Delco Radio is the world's largest builder of automobile radios—the leader in production and assembly of component parts.

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Delco Radio developed many of the most important advances in automotive radio . . . has outstanding experience in this field.

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Each and every step in the manufacturing of Delco Radio products is closely supervised to maintain high, uniform product quality.

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IN MANUFACTURING

Completely integrated for efficient production from raw material to finished product, Delco Radio meets any customer need.

DELCO RADIO Division of General Motors
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PHOTOGRAPHY

Hold it! This young photographer looks deep into his 4 x 5 Graflex. R. E. Schmitz of Washington, D. C. took this photo with his Speed Graphic at F1-200.

New Cameras Announced By Ansco

A complete new line of cameras has been introduced to the photographic market by Ansco, Binghamton, N. Y.

These new cameras are imported from Germany by Ansco exclusively, and made for them by the Agfa Camerawerk, U. S. Zone, Munich, to Ansco's specifications. The cameras were styled by Raymond Loewy, are streamlined and practical and contain many features which simplify film loading and camera operation in general.

Three of these are described below:

The Ansco Karomat
(Figure 1)

A precision engineered 35mm camera, using standard 35mm black-and-white and color film cartridges. Supplied with either Schneider f:2 Xenon or Rodenstock f:2 Heligon lenses (fully corrected six-element hard-coated objectives), the Ansco Karomat features the very latest type of fully synchronized Synchro Compur Rapid shutter, this full-range synchronization permitting the use of all types of flashlamps and electronic flash units at speeds from 1 second to 1/500th second, Time and Bulb.

A unique feature of the Ansco Karomat is its rapid film transport lever (ideal for fast sequence shooting), located conveniently in the upper right hand corner of the camera near the body shutter release. This unusual mechanism transports the film and at the same time sets the shutter automatically when the photographer pushes the lever through a 90 degree arc. Once the diaphragm opening and the shutter speed are set, the operator can shoot the entire roll of film within seconds without touching another thing but the advance lever and the shutter release.

The Ansco Karomat is equipped with a wide base lens-coupled split-image type rangefinder. Both rangefinder and viewfinder are combined in a single window . . . the actual picture area is always visible to permit the photographer to compose the picture while focusing. The camera body is made of metal throughout, it is covered with genuine leather, and all exposed parts are of satin-finish chrome.

Focusing range is from three feet to infinity. The camera also incorporates a depth of field calculator, and automatic film counter, a flashgun accessory clip, a self-erecting lens panel with rigid six-point suspension. The camera will accept all standard flashgun with continental connectors.

Ansco Speedex Special
(Figure 2)

The Speedex Special is Ansco's best and most versatile folding camera. The lens is a hard-coated, fully color corrected Agfa f:4.5 Apotar Anastigmat. Its focal length (85mm) is slightly greater than the diagonal measurement of the negative to give pictures with improved perspective and a pleasing angle of view. It has the newest Prontor S shutter with adjustments for full-range synchonization, permitting use of all types of flashlamps and electronic flash units at speeds from 1 second to 1/300th second, T and B. The Ansco Speedex Special has a double-exposure prevention devise, depth of field scale, built-in self-timer with a delay of about 10

Figure 1

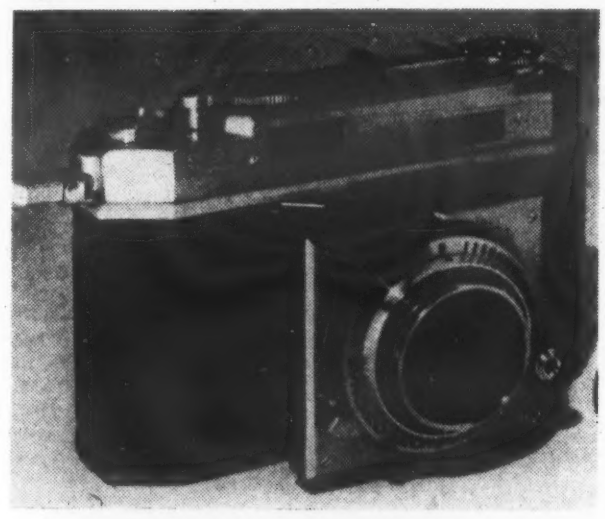


Figure 2

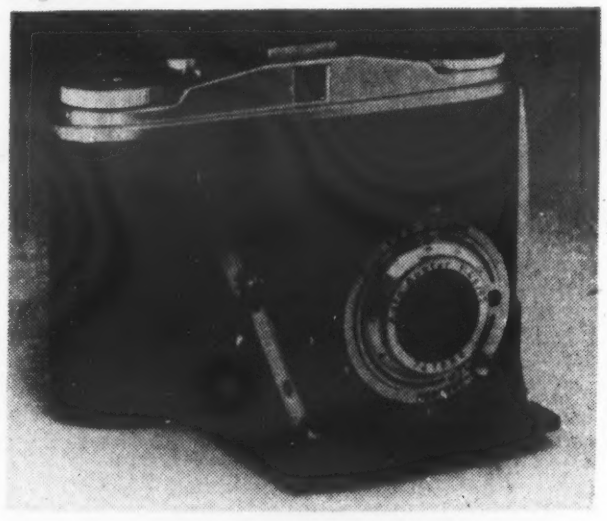
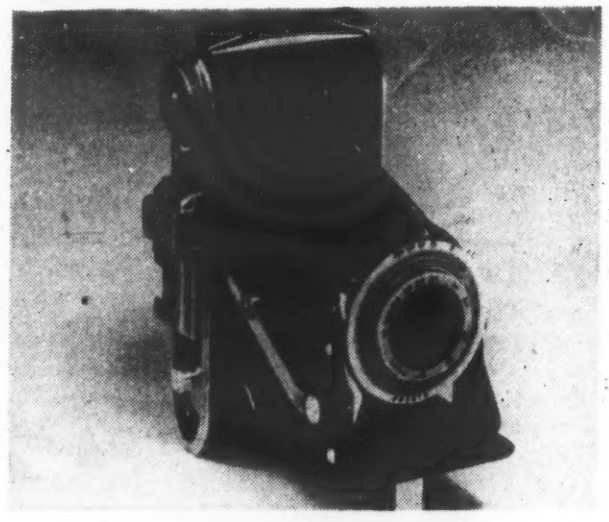


Figure 3



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for Sharp, Clear Studies of Distant Objects

and COMPLETE RANGE of ACCESSORY LENSES from 3.7mm to 80″

The 80″ f/14 and the 40″ f/8 Mirrotel Lenses are special purpose telephoto lenses for making sharp closeups of very distant objects . . . 80- and 40-time magnification. Mirrotel lenses have the amazing new mirror optical system, which absorbs less light . . . is more efficient . . . has greater resolving power. Mirrotel lenses are lighter, shorter and more compact than conventional systems.

FASTAX users now have a complete range of accessory lenses . . . from 3.7mm wide angle to 80″ with field of view ranging from 142° to .36°.

WRITE for more detailed information on these new wonder telephoto lenses and the world's fastest High-Speed Motion Picture cameras.

Wollensak
MEANS FINE LENSES

OPTICAL COMPANY • ROCHESTER 21, N.Y.

seconds, and an easy-to-handle swing-out film loading spool. It is constructed entirely of metal and covered in durable, attractive black-grained Robusite with trimwork in satin-finish chrome. It also includes an eye-level optical type subject finder, body shutter release button, an accessory clip for flashgun and a self-erecting front. Picture size is 2¼ x 2¼ on 120 roll film.

Ansco f:4.5 Viking
(Figure 3)

The Ansco f:4.5 Viking is a highly versatile camera for picture-taking indoors or out, night or day, flood, flash or natural lighting. The lens on this camera is the Agfa f:4.5 Agnar Anastigmat, hardcoated and color corrected. The Pronto Shutter is synchronized for all flashlamps and flash tubes and provides a choice of four automatically timed speeds (1/25, 1/50, 1/100 and 1/200 second, and Bulb.) The built-in self-timer can be used to delay shutter action for about 10 seconds.

The camera's focusing range is three feet to infinity; it gives 2¼ x 3¼ on 120 size rool film. An eye-level optical, subject finder and a swing-out film loading spool, flashgun accessory clip, body shutter release and convenient carrying handle are part of this camera.

• • •

PSA Convention Highlights

Cameras with effective focal lengths up to 80 feet which give the Army details about the behavior of high altitude rockets were described at the convention of the Photographic Society of America, August 13 to 16. The equipment of the rocket scientists consists essentially of astronomical types of telescopes mounted on gun turrets which carry motion picture cameras that make 60 frames a second, as compared with the 24 frames a second used in sound movies. Photometric and spectographic equipment may also be swung into position to give photographic records of the intensity and the kind of light emitted by the rockets. These records have furnished information about fuel burning processes and heat distribution within the jet.

Also discussed at the PSA convention was the use of a movie camera to solve the mysteries of the workings of a blast furnace. The camera used to take pictures of what occurs inside a furnace takes 3500 frames a second. Used for research in steel, slow motion color movies revealed brilliant particles of coke moving at speeds up to 200 feet per second at the bottom of an 80-foot tower filled with granular solids.

The use of photography in textile engineering was explained to the convention in New York also. High-speed still and motion pictures, time-lapse and other types of photography have proved valuable tools in the design of textile machinery. This phase of industrial photography permits the observation and recording of various phenomena otherwise impossible to study when new machinery is being considered. Research studies were further aided by use of electron micrographs, x-ray diffraction photographs, and fluorescence, ultraviolet and infrared photographs.

New developments in the formulation of lacquers which are applied to photographic prints and transparencies may prove of tremendous value in achieving greater permanence of photographs, the PSA convention was told. With the use of recently developed chemicals, including resins, Mr. Hubert O. Ranger of South Hadley Falls. Mass., said that it is expected that the new lacquers will prove to be particularly valuable in the case of color materials where dyes are liable to change in appearance with extended aging.

New, Wide-Angle Photographic Lens

Borne on the mighty wings of the Strategic Air Command's inter-continental reconnaissance bombers, American cameras "seeing" through unusually sharp wide-angle lenses can now record and bring back accurate information from any spot on the globe.

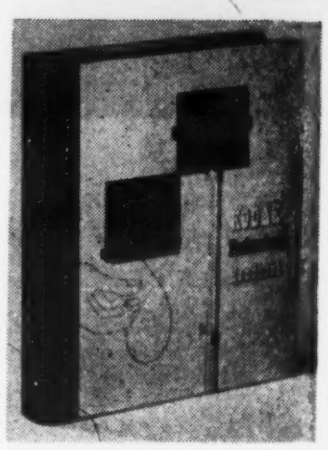
One of the important keys to the keen "vision" of the world-ranging RB-36 bombers of the 5th Strategic Reconnaissance Wing at Travis Air Force Base, Calif., Air Force officers disclosed, is a Bausch & Lomb photographic lens which enables a single aerial photograph to show three times as much area as was previously possible from the same altitude.

The lens, called the Metrogon, was developed by the Bausch & Lomb Optical Co. of Rochester, N. Y., and has been in use for some time but it has just been disclosed that Air Force developments now enable it to range the world in seeking out and recording vital ground information.

Key to the importance of the coated Metrogon lens is its combination of very wide angle with sharpness and freedom from distortion at the relatively high speed of f:6.3.

NEW PRODUCTS For The Photographer

Two new handbooks—one for the industrial and one for the professional photographer—have been announced by the Eastman Kodak Company. The majority of the material included in the Industrial Handbook is new material which has not been published before. The Professional Handbook is intended for professional photographers who wish to be competent craftsmen as well as capable artists. It is not only a reference book of facts and figures, but a record of processes and a manual of the craft of photography which every professional photographer can use to advantage. . . .



The new Bausch and Lomb electrically lighted Magnifier is shown here being used to inspect a machine part. The instrument magnifies five times the inspected object, which is flooded with direct light from the 110-volt illuminator handle. Shown in the foreground are the alternative battery-powered illuminator handle and two accessories included with each instrument without extra cost—a non-illuminating handle and a metal tripod which multiply the Magnifier's use in factory, laboratory, and home workshop. . . .

The Kodak 2-way Safelamp, a new inexpensive safelight for amateur photographers who develop and print their own pictures, is now available. The new safelight can be used with either one or two safeflight filters. It can be screwed into an overhead or wall socket, and used to illuminate either a general area, the entire darkroom, or a specific working surface such as a sink or table top. The Safelamp is supplied with one 3¼" x 4¾" wratten Series OA Safelight Filter, and a 15-watt, 110-130 volt lamp . . . Features and applications of the RCA Victor 16mm sound film projectors, the RCA 16mm magnetic recorder-projector, and a wide variety of RCA sound products are described in three new booklets just released by RCA Victor.

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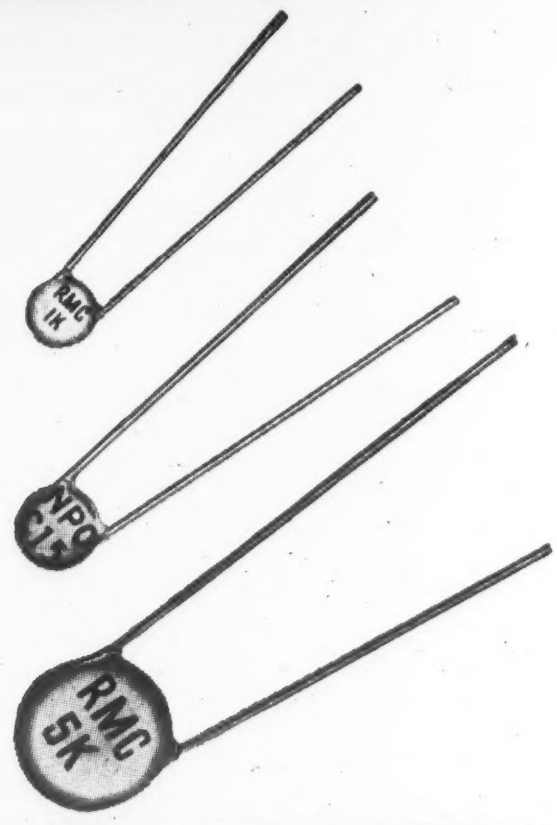

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Radio Military Amateurs

Standing, left to right: C. D. Chapman, CTSN, USN (WOBDA); H. M. Shroyer, CT3, USN (WOAEK); E. H. Frantz, CTC, USN (W3FQS); F. A. Martin, MSGT, USMC (W4PJM/JA2MB), Vice-President; W. D. Keim, CTC, USN (W3KYF/JA2WK), Secretary-Treasurer; V. H. Parks, (W9BUR/JA2VP); G. R. Keith, CT2, USN; D. S. Metzger, CT1, USN (JA2SM). Seated, left to right: J. H. Elgin, CT3, USN (WOCMU); G. M. Koontz, LT(CEC), USN (WOTFW); E. Aymar, CDR, USN (W1GO); Fran Aymar (W4RWO), (XYL of W1GO); E. L. Battey, CDR, USNR (W4IA); R. A. Eisen, CT1, USN (W6QOY), President.

Name Change for Mars

The name of the Military Amateur Radio System has been changed to the Military *Affiliate* Radio System, it was announced September 10 by the Department of Defense. The program will continue to be known by the short title: MARS.

MARS is a joint Army-Air Force program. The two services have organized the efforts of skilled technicians in order to direct them toward one overall communications plan founded on a national, rather than a local, need.

The name was changed because the term "military affiliate" more clearly defines the relationship between the Armed Forces and individual members of the system. The word "amateur" was employed originally in order to emphasize the technical qualification for membership—possession of a valid amateur radio operator license issued by the Federal Communications Commission.

Brigadier General Ivan L. Farman

MARS Advisory Committee

Brigadier General Ivan L. Farman, USAF, Deputy Director of Communications, USAF, has been elected chairman of the Military Amateur Radio System (MARS) Advisory Committee for a one year term. The committee, at its quarterly meeting in the Pentagon, also named Colonel William D. Hamlin, Signal Corps, Chief of the Army Communications Service Division, vice chairman of the committee.

The MARS Advisory Committee is composed of military and civilian members representing the Armed Forces, The Federal Civil Defense Administration, Federal Communications Commission, American National Red Cross, American Radio Relay League and others. Its chief duties are to advise the Chief Signal Officer, USA, and the Director of Communications, USAF, on MARS operations and to recommend policy pertaining to coordination of civilian and military amateur radio activities.

Navy Mike and Key Club Yokosuka, Japan

The Navy Mike and Key Club, Far East is located at the Naval Base at Yokosuka, Japan. The club station, JA2KW, is well known in Ham circles, both for message handling and DX work. At last count, there were 105 countries worked and confirmed, and cards had been received from all states. Although this station is operated only in off-duty hours, as many as 1000 messages have been sent to the states and over 500 received in one month. Since early in 1949, a daily schedule, conditions permitting, has been maintained with W6BAM in Santa Ana, California on the 14 MC band. The traffic was so heavy last summer that an automatic tape keying head was used on the schedules with the tape cut before schedule time. Handling this heavy volume of traffic on the other end were W6BAM, W9GMV, W2NSZ, W5QL, W4DCE, and K4USA. At this time JA2KW was operated by W6KQK, W4BCA, W5VVQ, W3KYF, and W6QOY, who spent most of their spare time operating the station. The present club officers are: R. A. Eisen, CT1, USNR, W6QOY, Vice President, M/sgt. F. Martin, USMC, JA2MB. Sec.-Treas.—W. D. Keim, CTC, USN, W3KYF/JA2WK. Traffic Mgr.—J. Elgin, CT3, USN, WOCMU. The present licensee of JA2KW is R. A. Eisen—W6QOY. The lone XYL member of the club is Fran Aymar, W4RWO, wife of Cdr E. Aymar, USN, W1GO.

Colonel William D. Hamlin

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the most critical expert in the world

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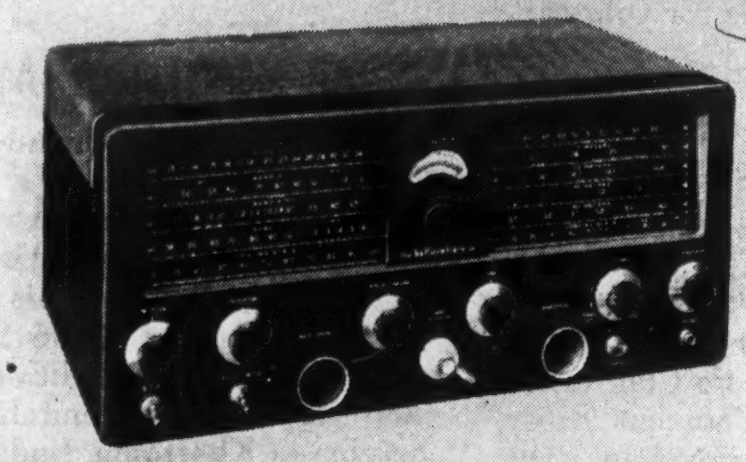

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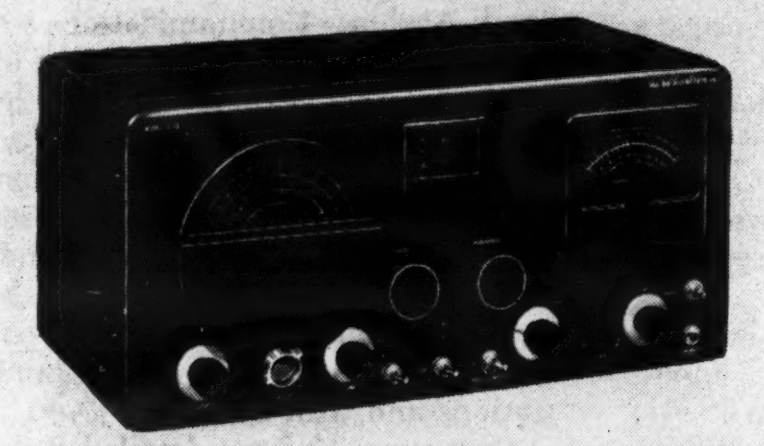
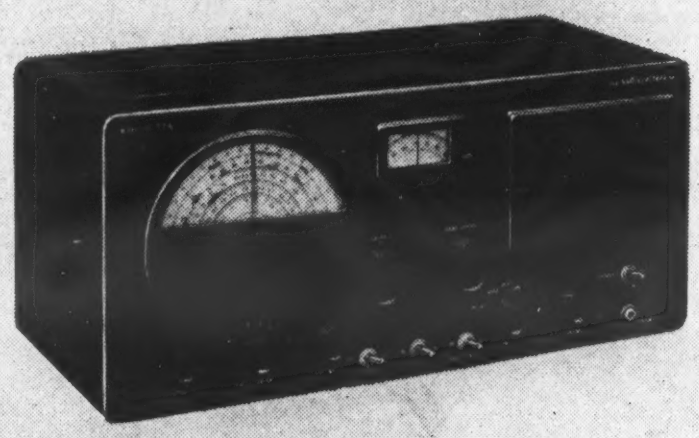


Precise Selectivity—The S-76—Amazingly selective! Crisp station separation. Double conversion with 50 kc 2nd i-f. Giant 4-in. "S" meter. 540-1580 kc, 1.72-32 mc in 4 bands. 1 r-f, 2 converters, 2 i-f stages. 5 position selectivity. Phono input jack, 3 watt output. 115 V AC, 9 tubes, regulator, rectifier **$169.50**



Low Price—High Performance!—S4OB—540 kc to 43 mc in 4 bands. Electrical band spread. Temperature compensated. 1 r-f, 2 i-f. 3 watt output. Built-in speaker. 115 V AC only, 7 tubes, plus rectifier. (S-77—same as S-4OB, for 115 V AC or DC) **$99.95**

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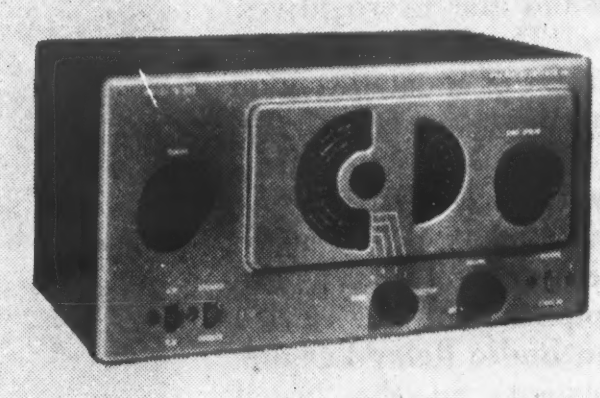


Washington "Ham" Group

Washington, the nation's capital, has its communications on wheels, as the Air Force Military Amateur Radio System takes to the road in weekly emergency net workouts. Shown below is probably the largest single collection of mobile stations ever assembled in one place as the Washington "Ham" group meets in front of the Pentagon. The capital MARS setup has eighty-one (81) members organized in three (3) communications networks for the purpose of "back-up" or emergency work in case of disaster.

The three nets meet weekly on Tuesday and Thursday evenings and interested Hams can tune in to their activities on the following frequencies: Net #1 . . .3307.5 KCs; Net #2 . . . 3497.5 Kcs; and Net #3 . . . 27994 Kcs.

Probably the most rabid fan of them all is Brigadier General Ivan L. Farman, Deputy Director of Communications-Electronics for the U. S. Air Force, who has "rigs" in his car at home, and even on his boat. General Farman has been the guiding hand behind the Air Force MARS program since its inception as a major entity in the nation's joint military-civil emergency programs.

• • •

The Director, Naval Communications, sent the following message to the Pacific Division Convention, ARRL, at San Francisco, 4-6 July 1952:

Amateur radio is unique in that it permits so many people to make a hobby of their work. This is particularly true in the Navy, where a large percentage of personnel in Naval Communications take an active part in amateur radio. By doing so they improve their skills and maintain their interest and enthusiasm in their profession.

It is the policy of the Navy to support and encourage amateur radio activities. In doing so, an effort is made not to take any action which would tend to jeopardize the independent status and the prerogatives of the amateurs. The Navy does not wish to organize the amateurs, but does wish to promote the use of the skills which they have acquired through their amateur activity.

I am confident that this Pacific Division Convention will add to the record of accomplishment and service of the American Radio Relay League. The many amateurs in the Naval Communications Division join me in sending you best wishes for your convention activities.

W. B. AMMON
Rear Admiral, U. S. Navy
Director, Naval Communications

Mobile Units of the Washington MARS group assembled in front of the Pentagon Building.

Naval Air Station Patuxent River, Md.

Station W3PQT is operated by the Patuxent Amateur Radio Club of the Naval Air Station, Patuxent River, Md. This club was formed in 1949.

Present membership totals twenty-seven. Nineteen of these are licensed operators. An increase in the number of licensed members is expected soon as a result of Novice classes now being conducted. Instruction in code and theory is given two evenings a week.

Station transmitter equipment consists of a Collins 32RA5, for use in the 80-, 40-, and 20-meter bands, and a Navy TDQ for the two-meter band. There are two HRO receivers and one S-42.

The club officers are as follows:

President ..... James E. Stone, MSGT, USMC (W3STU)
Vice-President ..... G. T. White, LCDR, USN (W3LTR)
Secretary ..... Robert Roth, ETSN, USN

AF Mars Eclipse Activity

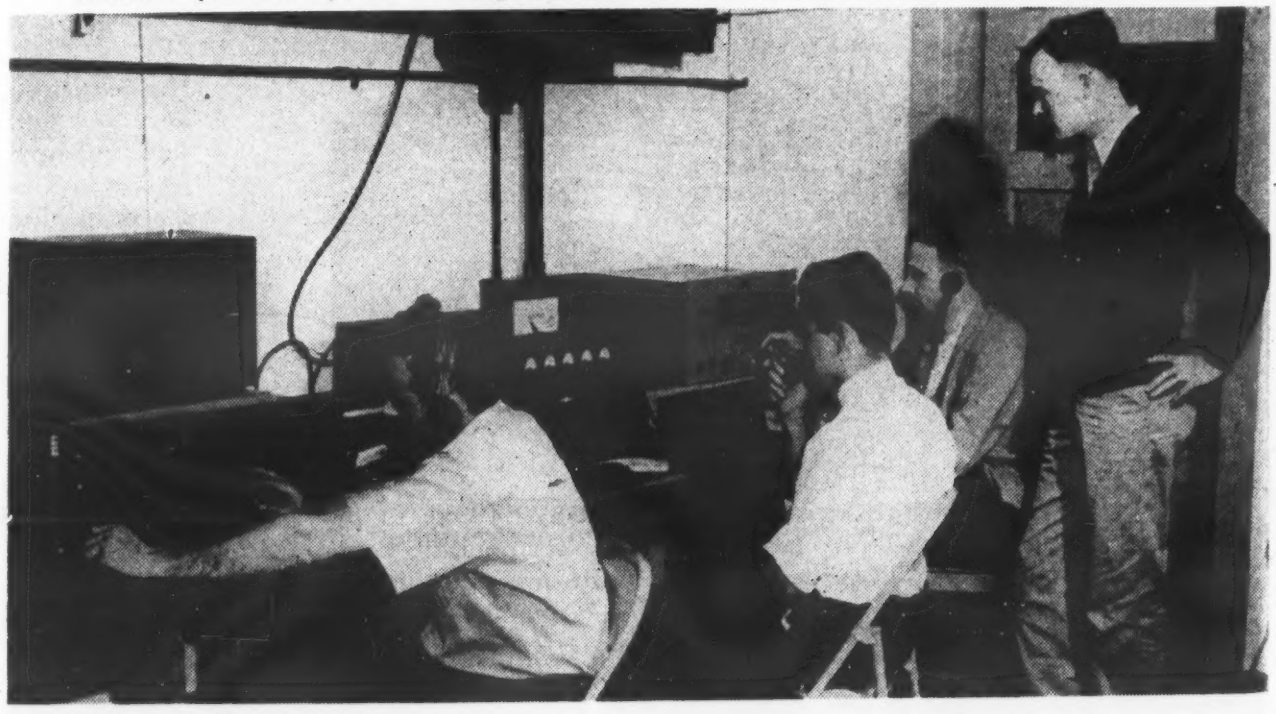
Major General Raymond C. Maude, Director of U. S. Air Force Communications-Electronics, received gratifying news recentl yin the form of a commendation to his Air Force Military Amateur Radio System for assistance to the expedition from the Aeronautical Chart and Information Service in Khartoum, Sudan recently during the solar eclipse there.

Operating out of the remote Sudan base camp the expedition was attempting to support and stay in contact with five scattered stations or observation posts across Africa and Saudi Arabia. Communications were practically non-existant and what was available was "expensive, slow and unreliable." The nearest Air Force station was Wheelus AFB in Tripoli.

MARS entered the picture soon after the camp was established and it wasn't long before the expedition had constant, immediate and reliable communications with all five tributary stations and with the U. S.

(See page 35 for a detailed feature on this eclipse.)

At sending position at W3PQT, left to right: E. M. Johnston, ATC, USN (W7CEV) E. H. Sommer (W3KMH); M. E. Riegel (W3SPT); J. E. Stone, M/Sgt. USMC (W2STU).



Radar Diary

(*Continued from page 26*)

When the big wind subsided and the damage surveyed, many hearts were heavy. The entire schedule would be set back many months. Undaunted, however, everyone concerned flung himself into the race against time and worked day and night, taking only enough sleep to keep going. Wood was used in many places instead of metal to hasten the reconstruction. For reasons then not apparent even to the antenna engineer, Slattery, the new wooden antennas seemed superior to the old metal structures.

Hurried tests were made on the complete system. The results were most gratifying, for the reconstructed set was even better than the one battered about and destroyed by the hurricane. Fate indeed was kind. . . .

So it came about finally that early one cold November morning in 1938, Lieutenant A. F. Cassevant, CAC, belatedly left Fort Monmouth leading the convoy carrying the only radar in the U.S. Army. It was a grotesque conglomeration of vehicles. Never, except perhaps in a circus had such a fantastic column taken to public roads. There were six trucks in all, with four specially constructed trailers, all weary veterans of World War I and seemingly always on their last mile. The big improvised trailers all had superstructures having the appearances of "design by Dali." Some of the projecting parts were covered with thin plywood, others were wrapped in canvas, loose ends of which flapped in the breeze. It would have been a clever espionage agent, indeed, to have looked at the caravan and guessed that the Army's most top-secret weapon was contained therein; although if Hitler had been fortunate enough to have the contents of that convoy he might even now be looking out of his window at Berchtesgaden.

For eighty uneventful miles the bizarre convoy rolled southward toward Pennsville, New Jersey, where the Delaware River was to be crossed by ferryboat. The ferry was waiting in its slip almost ready to leave.

"I can only take half of your trucks on this trip," bellowed the grizzled ferryboat Captain to the young Lieutenant.

"I can't split my convoy," shouted back the Lieutenant, well realizing that he, as the only officer with the convoy, was responsible for the safety of his precious cargo and that Army regulations were very plain on the subject.

"Okay, then wait!" came back not too pleasantly from the ferryboat bridge, "we'll be back in about an hour."

So they waited—and the ferry departed not quite loaded while horns from private vehicles in the narrow loading lane behind the convoy filled the air with long screams of protest.

Fifty minutes later the ferryboat re-entered the Jersey slip and loading started. All vehicles of the convoy were placed together on the port side of the ship. The crossing was uneventful.

In Delaware, when unloading started, the ferryboat captain strolled over to the Lieutenant and scowlingly said, "Since you Army guys made other people wait back on the Jersey side, now you take your turn. . . ."

One by one the civilian vehicles were allowed to leave the ferry while the Army convoy waited. What the ferryboat captain did not know was that the mysterious cargo, and particularly in the last truck, was largely made up of items employing many concealed tons of copper and steel. As the last civilian truck rolled off, a sound of tearing canvas came from the stern followed by a dull thud. A giant rectifier unit in the last truck had slipped to one side and fallen through the canvas, resting now partly on the truck and partly on the rail of the ferryboat. What was even worse, the angle of the boat was now so great, that even if the rectifier were righted and braced, it would have been foolhardy to attempt moving any of the trucks.

"Better load up the other side before we try moving off," dryly suggested the Lieutenant to the ferry Captain who seemed to immensely enjoy the situation.

With no obvious haste, waiting traffic was carefully placed on the high but empty starboard side of the ferry. When the last waiting vehicle was on board, balance was almost again achieved, the rectifier was righted and unloading of the Army vehicles proceeded slowly and safely.

One by one the trucks drove off and higher and higher rose the port side. When the last and heaviest vehicle left the boat, the ferry Captain's jaw suddenly sagged, for he did not anticipate quite the degree of reverse unbalance which followed. Now the port side rode so high that safe crossing was quite out of the question. It would be necessary to wait for additional traffic or shift the present cargo. The surly Captain had thrown a boomerang . . . there appeared to be no new traffic arriving and the drivers of the vehicles already loaded were showing signs of anger and disgust. . . .

Feeling, however, this to be no problem of his, the Lieutenant chuckled to himself and waved his convoy into motion, southward toward Fort Monroe.

Two hours after crossing the Delaware the convoy reached the bridge stretching across the wide Susquehanna River into Havre de Grace, Maryland. The mile-long structure had given faithful service almost since the Civil War but was now definitely showing signs calling for retirement. Its construction was typical of the horse-and-buggy era in that each direction of traffic was confined to separate narrow tunnel-like lanes, one on top of the other which, while adequate for Civil War type carriages, hardly provided a minimum of horizontal and vertical clearances for 20th century motor vehicles. However, the exact clearance of the bridge, supposedly shown on a sign at the entrance, indicated over an inch to spare—and surely, reasoned the Lieutenant, the State Highway Commission would also allow another inch or two as a factor of safety.

Slowly and cautiously, the convoy advanced into the bridge tunnel, floor planks groaning under the heavy load. The five leading vehicles crossed into Havre de Grace without mishap and only a few hundred feet remained for the last truck when disaster struck. . . .

With a harsh grating sound of metal torturing wood, the truck and its huge trailer came to an abrupt stop, jammed tightly between the floor and top of the bridge. The worst had happened—the weakly guarded and flimsily clad top-secret radar suddenly had become the focal point of most unwelcome public attention.

Southbound traffic quickly piled up with the inevitable crescendo of unfriendly automobile horns adding to the confusion. Almost immediately a State Trooper angrily buzzed down on the scene from the Havre de Grace side. The popularity of the Army fell lower and lower, hitting bottom when inspection showed that the sagging in the bridge grew much worse in the short distance remaining, and that the only solution was in deflating the tires and reversing the truck over the long mile back to the Delaware side.

Before the gathering crowd of irate civilians, who had stepped from their automobiles to learn why southward passage was now blocked, the State Trooper could not resist a bit of theatrics. Pushing his hat back on his forehead, and placing one foot on the

(*Continued on page 70 col. 1*)

truck hub cap, he remarked in a blatant voice, "Lieutenant — you could ask any officer in the Japanese Army the exact clearance of this bridge and he could tell you immediately, or know where to look it up. But the U. S. Army? Oh no—in broad daylight, and with not even a war for an excuse, they come along, and look what happens!"

Realizing the futility of suggesting to the Trooper that someone remeasure the clearance and change the sign at the entrance, the Lieutenant nodded in modest chagrin and then directed his men to deflate the tires. In the meantime the Trooper started the disagreeable task of backing up the mile-long column of civilian traffic to make way for the truck.

Shamefully, the Army behemoth crept slowly backward to the opposite side of the river followed meekly by the other five trucks of the convoy. Passage over the Susquehanna was finally accomplished over a more modern bridge many miles to the north—the entire incident costing a delay of one day in transit, not to mention four new giant tires and inner tubes.

On the evening before Thanksgiving, 1938, the tired, bedraggled radar convoy, wearily but proudly, rolled into Fort Monroe where the gear was placed in the custody of Colonel W. S. Bowen, President of the Coast Artillery Board. Lieutenant Cassevant and his men, after three hectic days and nights, relieved of their top-secret responsibility, were indeed, most adequately prepared to enter fully into Thanksgiving festivities.

During the weeks which followed, many exciting tests under controlled conditions were conducted. Airplanes were sent to record heights and detected. Long-range detection possibilities were demonstrated beyond question. Hedgehopping planes were detected in time for hasty defense measures. Artillery bursts were found to register on the radar indicators suggesting coincidence methods for fire-control. The stupendous military potentialities of the equipment became more and more apparent with each succeeding test. Equipment failures which occurred from time to time, obviously could be corrected. Size could be reduced, efficiency could be increased—the sound locator of World War I was now beyond question destined to become a museum piece!

When the Coast Artillery Board had gathered most of the data desired for evaluation purposes, arrangements were made for a demonstration of the equipment before a number of Air Corps officers stationed at nearby Langley Field. So it came about that one cold, cloudy, and windy night in December, 1938, an Army B-10 bomber streaked up into the darkness from Langley Field, Virginia, on a high altitude flight set up for the demonstration.

Little, however, did the Air Corps Captain piloting the big, twin-motored ship realize, that before the evening was over he and his crew would experience high adventure; the experience to be particularly unique in that the occupants of the airplane were to be initially, blissfully unaware of the danger lurking before them, while on the ground, a score of high-ranking Army officers were to spend a painful sixty minutes witnessing a life-or-death drama as a new page of history was being written for aerial navigation.

As the big bomber rose into the forbidding sky, the crew busied themselves preparing for a long evening of forced oxygen inhaling, for they were to fly that night where the air was thin and where man could not survive without adding to the natural atmosphere. Orders on the flying mission called for a series of simulated bombing runs over Fort Monroe, approaching from any angle within 180 degrees on the landward side at an altitude of 20,000 feet.

The radar operating crew were under instructions to report initial detection of the incoming airplane and to maintain a continuous track. When the airplane appeared to be within searchlight range, illumination by searchlight would be attempted, as in earlier tests, to give visual and positive proof of the equipment's effectiveness. All lights on the airplane were to be extinguished so as to fully simulate conditions of war.

According to instructions, the pilot flew upward to the ceiling of his ship, reporting a broken cloud layer at 10,000 feet which he said would require navigation partly by instruments; but he anticipated no difficulty in carrying out his mission. The forecast was for the clouds to break, so it was expected that weather satisfactory for searchlight operation would exist by the time the bomber was on course. At 20,000 feet the pilot leveled off and reported his position as about 30 miles west of Fort Monroe and said he was coming in on his first run.

The radar gear was placed into operation and the search began. The distinguished visitors from the Air Corps gathered around the various pieces of weird equipment watching and waiting for the operators to call out that detection had been accomplished and that radar tracking was underway. Many were even skeptical as to possible success—for radar was new, and to most of those present this was a first experience with the device, since airborne radar was then nonexistent.

Back and forth, up and down—the three great antennas of the radar combed the 180-degree sector looking for the "intruder" racing at them through the darkness. But something appeared to be wrong. The indicating instruments showing nothing which could be taken for an airplane even though the apparatus showed every indication of being in perfect operating condition.

A message came down from the pilot, "Now directly over Fort Monroe at 20,000 feet—unless there are other instructions, will turn and fly west 25 miles and repeat course."

There were no other instructions. The pilot appeared to be complying exactly with orders given earlier.

The visitors gathered in small groups and some shook their heads indicating grave doubt over the new invention. The operators and the Coast Artillery officers were perplexed. Why, they wondered, was tonight different from other nights when successful tests were made under similar conditions? Failure before the assembled flyers would add to their disbelief that ground targets could be protected against aircraft by ground-based artillery.

Again came the terse message from the bomber, "Am now about 25 miles west of Fort Monroe, will turn and again approach you within the prescribed sector at present altitude of 20,000 feet."

Once again the radar men strained every sense as their instruments combed the western sky from the north to the south and up to the zenith. The hoped for indication failed to appear on the oscilloscopes. The visitors were now noticeably showing signs of impatience. Said one general, "I think I'll leave and have them call me some other night when they get the equipment working. . . ."

He left!

A few minutes later a sardonic message came down from the sky. "Am now over Fort Monroe at 20,000 feet —where is that searchlight you fellows were talking about?"

Now, considerably alarmed, supervisory personnel met for a hurried discussion. Other visitors started to stroll toward their automobiles.

"I think," said the Signal Corps physicist in charge of technical oper-

(Continued on page 72)

YOUR RADAR DEFENSE MADE STRONGER BY G-E ELECTRONICS RESEARCH

EVEN AS YOU READ THIS, the U. S. Air Force is strengthening and expanding a vast continental radar network stretched around the strategic approaches to the U. S. and its vital production centers. The goal —to complete an electronic nerve system to detect sneak bombing missions which might be launched at us from half the world away.

Through around-the-clock research in electronics and by the manufacture of the most advanced radar equipment, General Electric is working to give you a warning system surpassing anything heretofore available.

Improvements in our radar defense enable U. S. jet interceptors to locate the enemy quicker—farther away from our industrial centers.. Precious minutes saved by more efficient radar can well be the minutes that save an American city from destruction.

G-E electronics research and production facilities are helping provide better radar not only for ground stations, but also for planes, ships, and submarines. In these vital military applications as in television, radio and all other fields of electronics, you can look to General Electric for leadership.

You can put your confidence in—

GENERAL ELECTRIC

AIR FORCE OFFICER PLOTS UNIDENTIFIED PLANES. Transparent chart in Air Defense Command Headquarters resembles giant spider web, gives continuous visual picture of many radar observations.

TYPICAL G-E RADAR ENGINEERS are young, competitive, progressive. At G-E they see their ideas developed and put to use. More than 60% of the work at Electronics Park now is devoted to the latest electronic equipment for the armed forces. Engineers not now engaged in defense programs are invited to write to Technical Personnel Office, General Electric Company, Electronics Park, Syracuse, N. Y.

A RADAR STATION (LOCATION MILITARY SECRET) KEEPS ITS "EAR TO THE AIR." The giant elliptical antennas shown above, have "sails" of lace-like steel to cut down wind resistance. Sweeping the air in endless watch, these "sails" send out V-shaped beams which detect planes as far off as 250 miles. Many of the big antennas are protected against high winds and weather by "radomes" of rubberized fabric. The balloon-like "radomes," supported only by internal air pressure, permit transmission of radar energy without loss of power.

Radar Diary

(*Continued from page 70*)

ations, "it is imperative that we look to the east and see if by any chance he is off-course and over the ocean."

"Seems hardly necessary," said the Coast Artillery officer, Colonel Schuyler, directing the tests, "the pilot appears to know exactly where he is, and the boys at Langley do a lot of night flying."

"Well, let's try one more run, and then search eastward, said the physicist, and turned to supervise the operation of the equipment.

There was no difference. When the pilot reported his position as over Fort Monroe and when the radar again failed to find suggestion of a moving echo in from a westerly direction, obviously, either radar or aerial navigation were to blame. Unfortunately too, at 20,000 feet, airplane motors could not be heard as a check on either.

"OK," said Colonel Schuyler to the physicist, "try searching east, that's about all left for us to do. If we don't find him we might as well order the ship back to Langley and close up for the night and work over the equipment tomorrow. Can't see how he could be east though, for his orders were to stay over land. Those boys know that night flying over water is dangerous—they might have to use parachutes, you know, in case of trouble."

The physicist quickly moved to the control equipment and gave the orders to reverse the search field. Slowly the three massive antennas and the attedant optical gear turned through 180 degrees and pointed eastward over the black menacing waters of the stormy Atlantic Ocean.

Almost immediately, the three operators excitedly sang out, "Target . . . Target . . . Target!"

Radar tracking started!

The remaining visitors quickly returned to points of observation around the radar. At last there was something to see. . . .

"There he is," the range operator cried, pointing to a vertical deflection on the screen of the cathode ray tube.

"How do you know it's an airplane?" asked one of the visitors.

"Watch — tell the pilot we think we have him and ask him to bank his plane," shouted the physicist to the radio communications operator — "Keep you eye on the echo, General Andrews!"

Back went the message, "We think we have located you, bank your plane for identification."

"Roger," came back over the air.

Almost immediately, the "pips" on the indicating oscilloscopes bobbed up and down as the reflecting area of the airplane varied due to the turning motion. When the flight was again steady, the "pips" became stationary. Identification was positive!

Some calculations were hurriedly made. Colonel Schuyler, noting the seriousness of the findings, quickly took the microphone himself and transmitted to the pilot, "Captain, you are far off course—your position is 23 miles east of Fort Monroe. Turn and fly west. You are over water and moving off towards Europe at a high rate of speed!"

Again the radar "pips" bobbed as the big bomber banked and turned. Then slowly—very slowly, the radar started showing a decreasing range. The airplane was returning.

The control operator of the radar made a rapid calculation. From the movement of the "pip" he could calculate the ground speed of the airplane. The answer seemed incredible. The pilot appeared to be bucking a 120-mile per hour wind, and that meant his maximum forward progress could be only 20 miles per hour. It would take over an hour even before he would be overhead!

During that long uncertain hour the radar maintained a continuous track. Messages were sent from time to time giving the pilot his position. Finally the radar showed the airplane to be at a distance of 12,000 yards which was within searchlight range. The radar-directed searchlight was turned on and a narrow pencil of light stabbed the black night, but futilely painted only a white disk on a cloud two miles above the earth. Two miles higher, above the cloud, radar said there was an airplane!

The white disk on the underside of the cloud slowly but continuously moved westward in synchronism with the radar data. Fate was kind for the track appeared to be in a direction of an opening in the cloud formation—stars could be seen through the approaching cloud break. The situation was becoming dramatic. Would there actually be an airplane in the searchlight beam when visibility became unlimited?

Now the disk of light on the cloud disappeared, and the rays of the searchlight beam were unobstructed. All eyes anxiously strained for the sight of glistening wings. Human life was at stake!

First to see the bomber were the experienced men of the searchlight crew. Then others saw it—soon everyone present could see the little fly-like speck which was an airplane flying 4 miles above the earth. In that airplane were four men who were pulled back from great danger to safety by a new visible electronic force!

The remainder of the evening was highly successful. Other trials were made. At will the radar found the airplane and directed the searchlight beam with uncanny accuracy. Very convincing to the men who fired the ainti-aircraft guns!

But the men with wings saw more than fire-direction or early warning. In radar they saw an answer to the flyer's greatest problems—navigation and blind landing! Acceptance was instantaneous! Airborne radar would surely follow through more research and engineering. Man had succeeded finally in extending his sense of direction and position incalculably over his natural powers. No longer was he to be limited by his human eyes and ears. Now, with the powers of mythical Zeus on Mount Olympus, the blackest of nights or the thickest of clouds could be swept away in accordance with his will.

- - - — - —

Doing It The Hard Way

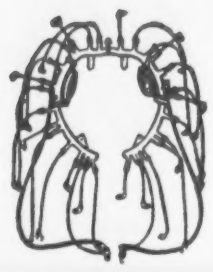
(*Continued from page 27*)

apparatus, as a whole, decreases considerably as the steps of the transformation are increased.

"In systems of this type in order that resonance between the alternator current and the antenna system may be maintained, it becomes important that the frequency of the alternator may remain constant; in consequency, the speed of the driving motor must be carefully governed and to this end several devices have been brought forth, the principal one being a signalling key fitted with a special set of contacts which, just previous to the closing of the key, add resistance in the motor field circuit, maintaining a practically uniform speed of rotation.

"The alternator at the Sayville station has a capacity of 100 kilowatts and gives antenna current of about 140 amperes. Fair communication is effected with the station at Nauen, Germany, throughout the 24 hours of the day, but the best results have been obtained during the dark hours. At present the Sayville station operated at the wave length of 9,400 meters, the antenna frequency being slightly above 30,000 cycles per second."

EDITOR'S NOTE: OK Folks! Have at it. By what hyphenated name was this system known? As usual, drop your card to Dept X, c/o SIGNALS and watch for the tally next issue.



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Complete harness assemblies with detachable unit leads or rewirable leads. Igniter or ignition lead assemblies for jet and reciprocating aircraft engines and military vehicles.

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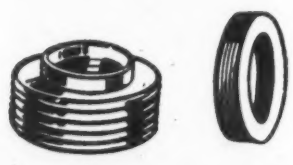
Precision worm drive — for aircraft, automotive, marine, special-purpose and industrial use. Vibration-proof — will not work loose. Corrosion-resistant steel.

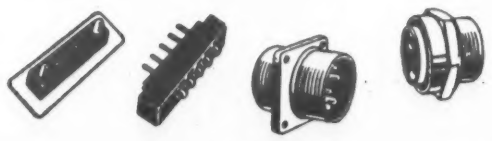
ACTUATING SYSTEMS

Electrical, mechanical, and hydraulic actuators for aircraft controls, valve closures, landing gear, or virtually any other type of equipment to manufacturer's specifications.



WELDED DIAPHRAGM BELLOWS

"Job engineered" to meet your requirements and make possible the use of bellows in applications where they could not previously be considered.



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Communications Sets Its Sights Ahead

(*Continued from page 19*)

and other troubles are few. The new method is received with favor by the customers. It seems clear that this whole plan represents an impressive forward movement in the development of telephone service which will tend toward a continuing increase in the use of long distance service in the future.

Development of the Kinds and Quantity of Communication Needed

The third reason for the continued development of the telephone system mentioned at the beginning of this paper was the development of the needs of the American public.

A striking illustration of this is the current rapid development of television transmission. On September 4, 1951, the image and words of President Truman opening the international conference on the Japanese Treaty in San Francisco were brought across the country to be broadcast from the television stations throughout the East. This marked the inaugural of transcontinental television transmission facilities of the Bell System. The broad band systems, coaxial cable and radio relay, which are described above, are in fact the only available types of transmission facility capable of distributing television programs to groups of broadcast stations. That is because television transmission requires a very broad band transmission channel, comparable with that required for 600 one-way telephone channels.

The Bell System television transmission network now aggregrates 25,000 miles of channel in service, and is rapidly being expanded to twice that mileage. Television is growing so fast that its future seems very promising. For some time, the number of television broadcasting stations in service was frozen at about 100 by the Federal Communications Commission. Recently the restriction has been lifted, and in the months ahead the Commission will probably grant many of the applications for additional stations now before it, more than 500 in number. More frequencies have been made available for television broadcasting, so that, in some cases, there may be as many as 10 channels available in a single area.

There is evidence that the field of television ultimately will include many activities beside broadcasting. The motion picture industry is working hard on its relation to television, and can be expected either to use television as a part of the theater program on large screens or to develop a large output of motion pictures suitable for television, or both. Color systems are being developed. Attention is being given to the use of television for educational purposes and also for a wide variety of business and military purposes. The telephone companies are actively cooperating in these movements and propose to be in a position to provide networks to destribute programs to groups of theaters, to provide for color, and take care of any other developments which may be brought forth.

Mobile Service

The expansion of telephone service to various kinds of mobile units is another example of the development of new needs for electrical communication. A wide use is already made of telephone service to motor vehicles. Police cars, taxis, trucks, buses, and business vehicles of many kinds, totaling perhaps 250,000, now have service in one form or another. Many are private telephone systems connecting the cars with the headquarters of the organization involved. The telephone companies of the country also give a general mobile service, by which communication is established between a car and any other commercial telephone in the country. Service is now offered in 500 cities and towns to about 12,000 vehicles.

There is a rapidly growing use of radiotelephony by other kinds of mobile units. Telephony to ships, which started with ships on the high seas and along coastal waterways, is one example. Already 19,000 harbor aircraft and pleasure craft are equipped, including craft on rivers and lakes as well as on the oceans. General telephone service to passengers on trains is expanding, and about two dozen trains are so equipped at the present time. Telephone service is fundamental to the operational control of airplanes, and this is a private service. But in addition to this, about 350 planes have general Bell System service.

"Walkie-Talkies" practicable for short range have been developed and put to a variety of uses. It is interesting to observe that in 1940, for experimental purposes, the Bell laboratories put together a telephone set equipped with a very-short-range radio to eliminate the need for a telephone cord. You can imagine at some future time the lady of the house taking the telephone with her as she goes for a walk in the garden, and making and receiving her telephone calls there.

Auxiliaries to Telephone Service

The experimental cordless telephone set is one illustration of the fact that the development of new devices and the development of customers' needs combine to bring a continuing change in the services offered in connection with ordinary telephone usage. This is far too great a field to cover generally, but two or three illustrations of this type of development will be of interest.

For quite a long time, the telephone companies have offered, in various parts of the country, several forms of answering service, i.e., means whereby telephone calls will be answered and messages taken when the subscriber is absent. With the great improvement of automatic recording and reproducing systems, it now appears to be practicable to offer that type of service with automatic devices. The development of types of equipment suitable for this purpose is at an early stage. The experiments which we have been conducting, however, seem to indicate that this should have a field of usefulness in the future.

Looking ahead, additional auxiliary devices to meet special telephone requirements are to be expected. One example is the distant-talking set, whereby one talks and listens to a box on his desk without holding anything in his hand and without operating a switch to change from talking to listening. To provide good general service with such a device involves formidable technical difficulties. but it is expected that these will be overcome. Provision for conference calls has been a part of telephone service for years—that is, calls in which a group of people in various parts of the country can be connected together so that all hear what each one says. Looking forward, great improvements can be made in this service.

The inquiring mind has probably asked before this when we shall have individual television with telephone calls. Bell System people will remember the demonstration of this form of service given 25 years ago. First between 195 Broadway and the Bell Laboratories and later between New York and Washington, demonstration equipment associated with appropriate circuits enabled those conversing to see each other on television screens while they talked. In spite of the tremendous advances in television in 25 years, there is no indication as yet when this would be a sufficiently economical service to appeal generally to telephone users.

(*Continued on page 76*)

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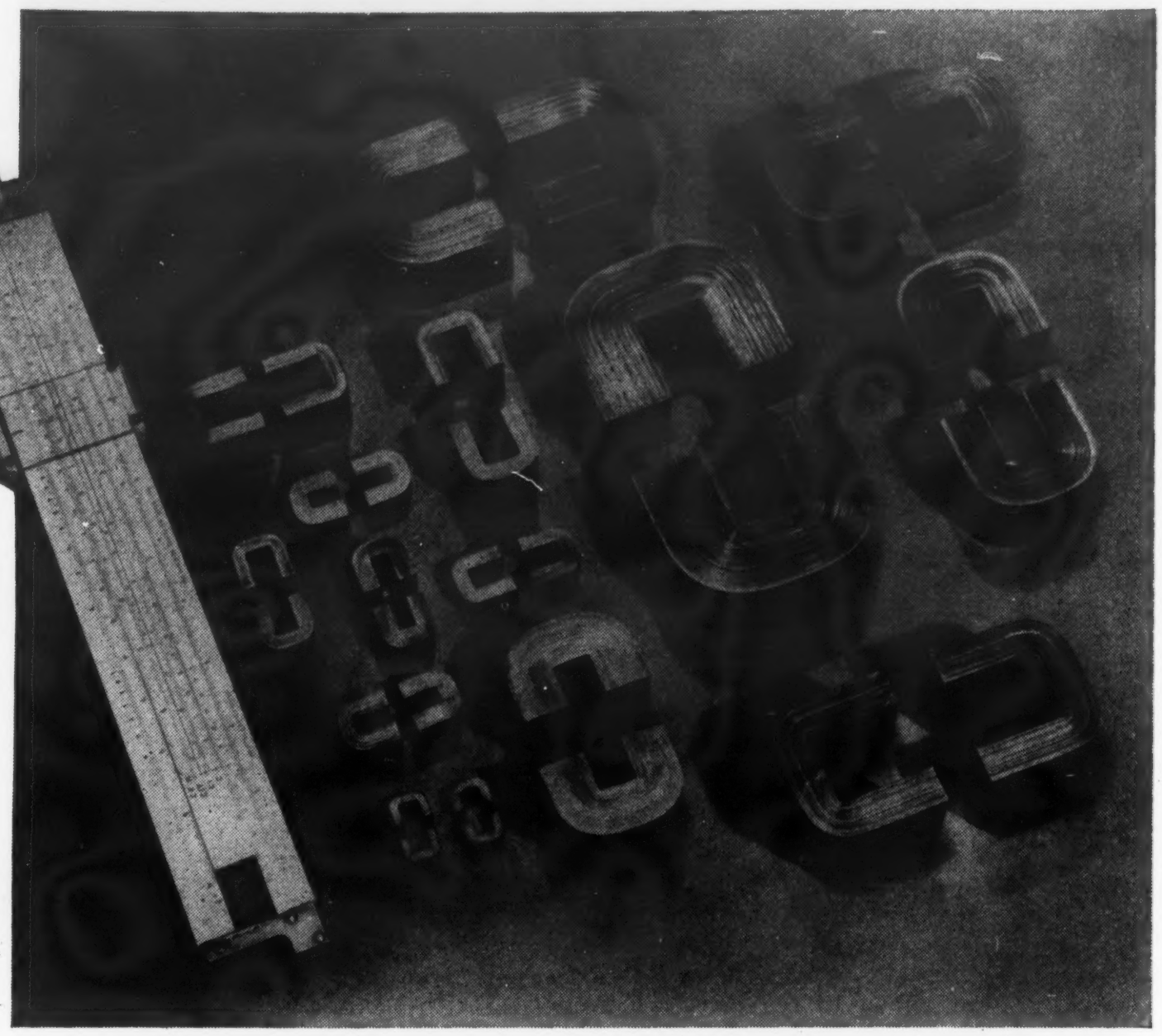

. . . wound from strip as thin as 0.00025"

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- ★ 2-mil cores are tested for pulse permeability at 2 microseconds, 400 pulses per second, at a peak flux density of 10 kg.
- ★ 1-mil cores are tested for pulse permeability at 0.25 microseconds, 1000 pulses per second, at a peak flux density of 2500 gauss.
- ★ ½ and ¼-mil core tests by special arrangement with the customer.

Now available—"C" Cores made from Silectron (oriented silicon steel) thin-gauge strip to the highest standards of quality.

Arnold is now producing these cores in a full range of sizes wound from ¼, ½, 1, 2 and 4-mil strip, also 29-gauge strip, with the entire output scheduled for end use by the U. S. Government. The oriented silicon steel strip from which they are wound is made to a tolerance of plus nothing and minus mill tolerance, to assure designers and users of the lowest core losses and the highest quality in the respective gauges. Butt joints are accurately made to a high standard of precision, and careful processing of these joints eliminates short-circuiting of the laminations.

Cores with "RIBBED CONSTRUCTION"* can be supplied where desirable.

Ultra thin-gauge oriented silicon steel strip for Arnold "C" Cores is rolled in our own plant on our new micro-gauge 20-high Sendzimir cold-rolling mill. For the cores in current production, standard tests are conducted as noted in the box at left—and special electrical tests may be made to meet specific operating conditions.

● We invite your inquiries.

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General Office & Plant: Marengo, Illinois

Letters TO THE EDITOR..

Ransom Quiz

Gentlemen:

The Disc Discharger Diagram illustrated in the July-August issue of Signal, is the Marconi circuit used at Clifton Ireland and Glace Bay circuit of the Marconi Co. in 1917.

The circuit is described on Pg 720 of the June 1914 issue of the Wireless Age.

There were also two other stations actively using a slightly different circuit of 300 KW in 1917. Bolinal California and Kahuku Oahu, T.H. each had two complete Marconi Synchronous Gap dischargers.

Bolinas normally transmitted to Honolulu for local delivery and for relay via Kahuku to Japan. After midnight on the west coast it was sometimes possible for Bolinas to transmit direct to Japan.

Homer D. Jaggers,
Bolinas, California

Company Articles

Gentlemen:

I was delighted to receive your letter of the 11th and it was thoughtful of you to send me three copies of the current issue of Signal in which appears an article about our company and its products.

We do most sincerely appreciate this cooperation on the part of the AFCA and its editorial and executive staffs, and our people here tell me that they are already making plans for 9000 reprints of the article!

Robert C. Sprague
Sprague Electric Company

It's Atomic!

. . . . .Surely did enjoy Col. Kalish's story in your July-Aug. issue. Congratulations on Signals content throughout.

Frank Johnson
Chicago, Illinois

In the May-June, 1952 issue, an error was made in Dr. Oleg Yadoff's article, "Modern Physics the Basis of Scientific Research in Engineering." The three equations on page 25, column 1, were misplaced so that they do not follow or clarify the text. The order should be:

(a) $$\frac{\partial^2\varphi}{\partial x^2}+\frac{\partial^2\varphi}{\partial y^2}+\frac{\partial^2\varphi}{\partial z^2}+\left(\frac{2\pi}{\lambda}\right)^2\varphi=0$$ *(wave equation)*

(b) $$\frac{\partial^2\varphi}{\partial x^2}+\frac{\partial^2\varphi}{\partial y^2}+\frac{\partial^2\varphi}{\partial z^2}+\left(\frac{2\pi}{h}\right)^2 mv^2\varphi=0$$ *(equation of wave mechanics)*

letting $mv = p$, we obtain, $$W=\frac{p^2}{2m}+v(x,y,z)$$

or $$\frac{\partial^2\varphi}{\partial x^2}+\frac{\partial^2\varphi}{\partial y^2}+\frac{\partial^2\varphi}{\partial z^2}+\frac{8\pi^2 m}{h^2}[W-v(x,y,z)]\varphi=0$$

We regret the occurance of this error.

Communications Sets Its Sights Ahead

(Continued from page 74)

Other Needs

So far, we have talked only of the needs for electrical communication which are already before us.

The increased complexity of our industrial organization and the rapid development of new electronic devices suggest almost unlimited future possibilities for the development of new communication needs. For example, electronic devices for computation and for other uses of data suggest that the transmission of data between the parts of a wide-spread commercial enterprise or an industry may become an important future element of communication needs.

Similarly, the great private-line systems, some equipped with automatic switching and with means for the storage and retransmission of messages which are now in use by a few large industries, may be the harbinger of a more general requirement for special communication systems designed to meet the specific requirements of large enterprises or groups of users in the future.

In this field, to be specific would be in the realm of pure speculation. The present development of industry, however, and of the art of communication, seems to indicate that here is a trend which may be expected to be of increasing importance in future years.

Needs of Communication by Defense Agencies

It is a remarkable thing how extensive and varied are the communication requirements of the defense agencies. Some of these are—to name but a few—communication systems for the Air Defense network, both warning and control; for anti-aircraft batteries; for Civil Defense warning and administrative networks; and for networks linking Army, Navy, and Air Force installations throughout the country. The telephone companies at the present time are providing private lines alone aggregating 500,000 miles of circuits. The variety and extent of use are rapidly increasing.

It is a fortunate thing for this country that the great growth of telephone communication has resulted in a vast network of telephone lines and installations throughout the country which can quickly be arranged to take care of the new defense requirements of the nation. It is also fortunate that the flexibility of the telephone system is such that a wide range of new services needed for the defense agencies can be developed and placed in operation in short order.

The Far Horizon

All of these factors—a trend to lower relative costs; the development of additional materials, devices, and facilities; and the development of needs of the telephone-using public—combine to stimulate the continued rapid growth of the telephone system.

By the steps of the Archives Building in Washington. where are stored the treasured records of the past, is inscribed the motto, "What is Past is Prologues". A friend of mine, driving through Washington in a taxicab the other day, asked the driver, "What does that motto mean?". "Well, mister," the driver replied, "roughly speaking, it means 'You ain't seen nothing yet'."

Without attempting to predict how closely or how rapidly we may approach the ultimate ideal which I have just described, or any of the specific steps which we have been discussing, I predict with full confidence: "Gentle Reader, you ain't seen nothing yet."

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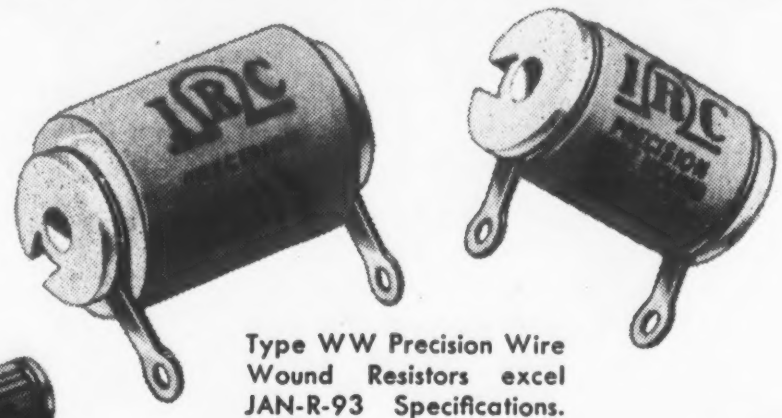
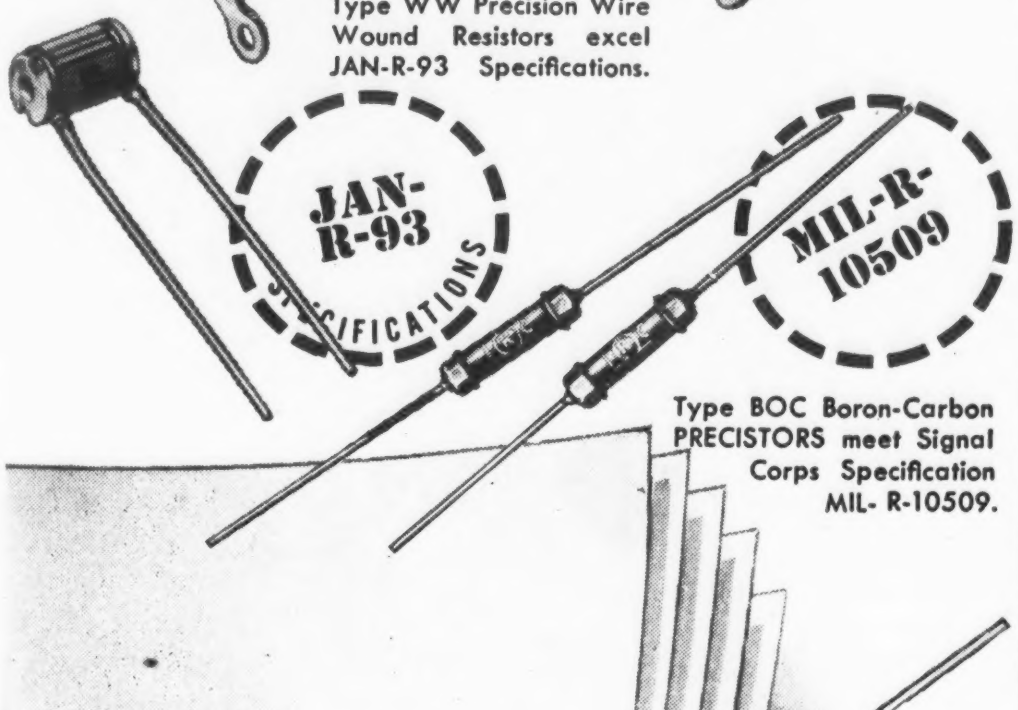
TESTS PROVE THESE NEW RESISTORS HAVE NO EQUAL FOR CRITICAL ELECTRONIC AND AVIONIC CIRCUITS

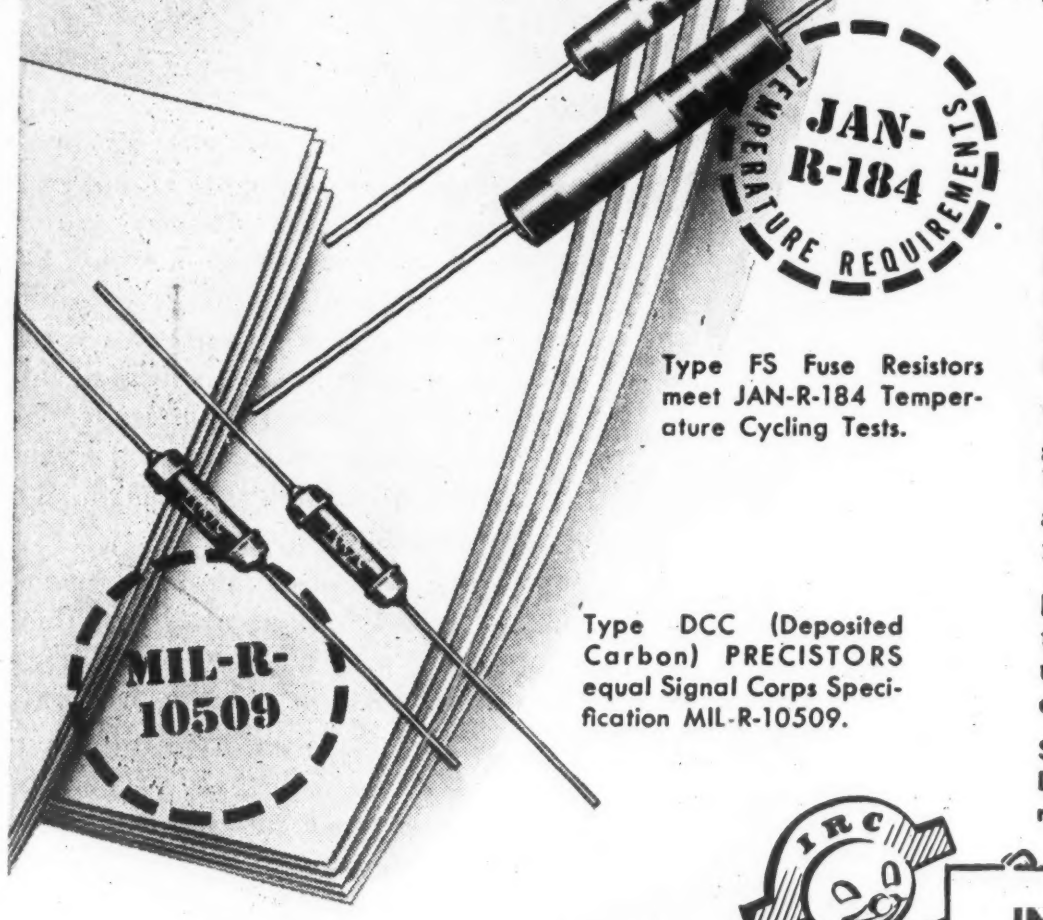


Type WW Precision Wire Wound Resistors excel JAN-R-93 Specifications.



Type BOC Boron-Carbon PRECISTORS meet Signal Corps Specification MIL- R-10509.

TEST RESULTS



Type FS Fuse Resistors meet JAN-R-184 Temperature Cycling Tests.

Type DCC (Deposited Carbon) PRECISTORS equal Signal Corps Specification MIL-R-10509.

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All-new Type WW Precision Wire Wounds far surpass JAN-R-93 Characteristic B Specifications! New winding forms hold more wire for higher resistance value. New winding technique ends possibility of shorted turns or winding strains. New terminations are rugged and strain-free. New type insulation beats humidity—assures long, dependable high temperature life.

	Original Resist.	1st Cycle % Chge	2nd Cycle % Chge	3rd Cycle % Chge	4th Cycle % Chge	Resist. at End of 100 hrs. load	Total % Chge	% Chge from Last Temp. Cycle to End of 100 hrs. load %	Resistance Chge at End of 100 Hrs. Load only % (no cycling)	
1	100,010	+.04	+.04	+.05	+.05	100,050	+.04	—.01	100,040	—.02
2	100,000	+.03	+.04	+.03	+.05	100,060	+.06	+.01	100,000	0
3	100,000	+.01	+.02	+.02	+.05	100,000	0	+.05	100,050	—.02
4	100,000	+.02	0	+.02	+.02	100,000	0	—.02	100,040	—.01
5	100,010	+.03	+.04	+.04	+.05	100,000	0	—.05	100,030	—.03
6	100,000	0	+.03	+.04	+.04	100,100	+.1	+.06	99,980	0
7	100,000	+.04	+.05	+.04	+.04	100,070	+.07	+.03	100,000	0
8	100,000	+.03	+.05	+.05	+.05	100,050	+.05	0	100,000	0
9	100,000	+.04	+.03	+.05	+.04	100,010	+.01	—.03	100,050	0
10	100,000	+.02	+.02	+.02	+.04	100,010	+.01	—.03	100,000	0
11	100,000	0	+.01	+.01	+.03	100,000	0	—.03		

Severe cycling and 100-hour load tests resulted in virtually zero changes in resistance. Other rigid tests prove Type WW's high mechanical strength, freedom from shorting, resistance to high humidity.

New Type BOC Boron-Carbon PRECISTORS offer tremendous advantages in military electronic equipment—radar, gunfire control, telemetering, communications, computing and service instruments. Type BOC's combine high accuracy and long-time stability, reduce temperature coefficient of conventional deposited carbon resistors, replace high value wire wound precisions at substantial savings in space and cost.

Type DCC (Deposited Carbon) PRECISTORS are the latest small-size, high-stability units for high frequency circuits. Voltage coefficient and capacitive and inductive reactance are low. Type DCC's are the *economical* answer to the needs of modern electrical and electronic circuits.

New Type FS Fuse Resistors are dual-purpose units, functioning as resistors under normal conditions and as fuses under abnormal conditions. They can be wired into circuits as easily as molded wire wound resistors.

Send for full technical data on these resistors. Remember—Your IRC Distributor can give you prompt delivery of experimental or pilot-run quantities—right from his local stocks.

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Type BOC Boron-Carbon PRECISTORS ☐
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Radio Astronomy at NRL

(Continued from page 37)

gions of the solar atmosphere. Spectrographic equipment was operated by the High Altitude Observatory to photograph the flash spectrum of the sun and thus to determine the composition, temperature, and density of chromospheric levels. Cinespectrographs were used by other NRL scientists to give information on the temperature of the photosphere and inner chromosphere. A major purpose of this expedition was to clarify conflicting measurements of the sun's atmosphere. Radio measurements indicate that the portion of the atmosphere nearest the sun, or chromosphere, is relatively cool, but that the temperature rises sharply to perhaps a million degrees at the outer edge of the sun's atmosphere, or the corona. Optical measurements, on the other hand, have indicated a temperature as great at 30,000 degrees in the chromosphede. NRL scientists believe that temperature measurements by radio means are more accurate than those which have been made by optical means, since the majority of the energy emitted by the sun's chromosphere is in the radio frequency region of the spectrum, rather than in the visible light region.

Within the United States, radio astronomy using microwaves is also being used at the National Bureau of Standards, and specifically, at the Central Radio Propagation Laboratory, as a tool in making radio propagation forecasts. Under an Office of Naval Research contract, Cornell University is studying solar and galactic radiations. Harvard University was the first, in the Spring of 1951, to detect radio emission from neutral hydrogen in interstellar space. This gas is believed to make up one-half the bulk of our galaxy, but is undetectable by any means using light waves. The radio emission is also restricted to a narrow band of frequencies at 1420 mc. Abroad, radio astronomy has engaged the attention of scientists in Canada, Australia, England, France, Germany, and—reportedly—the Soviet Union.

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Economic Field Mobilization

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tional security; an examination which includes not only a study of the interested government agencies, but also the several functions which stem from those agencies. These functions include the various controls and programs needed to keep a wartime economy healthy and in optimum production. A continuous survey keeps this part of the course abreast of current developments. Of particular interest are the periods devoted to production and procurement. Although procurement is outlined fully, the College, as an educational institution, cannot inform any particular concern of its detailed part in the mobilization program.

Lectures on associated elements, such as, technological progress, public opinion, war finance, and industrial security round out the program.

The Field Economic Mobilization Course is one of three types of courses conducted by the Industrial College of the Armed Forces in carrying out its mission of preparing officers of the Armed Forces for important command, staff and planning assignments in the Department of Defense, and selected civilians for important industrial mobilization planning assignments in any government agency.

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Economic Field Mobilization

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isfy the interests of otherwise-qualified officers and civilians who desire more complete instruction than that presented by the Field Economic Mobilization Course, or who are unable to attend the Resident Course. This popular and timely course was first offered in September 1950. The material presented is considered to be of wide interest to citizens in or out of uniform. Its professional value to Reserve and National Guard Officers has been recognized by authorization of a 48 point credit for retention, promotion, and retirement upon satisfactory completion. The enrollment of Regular and Reserve Officers serving on active duty has been increasing steadily. However, the graduation rate during 1952-53 is expected to permit acceptance of qualified applicants without delay.

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The 1952-53 class reported 21 August for the ten-month Resident Course. This course is held at Fort Lesley J. McNair, which houses the National War College and the Industrial College of the Armed Forces, both of which are at the highest level in the Department of Defense educational system. The curriculum of the two Colleges is integrated through joint and coordinated lectures and studies. This is mutually beneficial in developing the politico-military considerations affecting national security. The 1952-53 class is made up of selected regular officers of the Armed Forces and civilians from the Federal Departments. Instruction is conducted on the plane of the foremost graduate schools.

Further information in reference to any of the courses presented by the Industrial College may be obtained from:

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- Andrews AFB Control Tower Operations—Picture Story
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—Aesop's fable, "The Lion and the Bulls"

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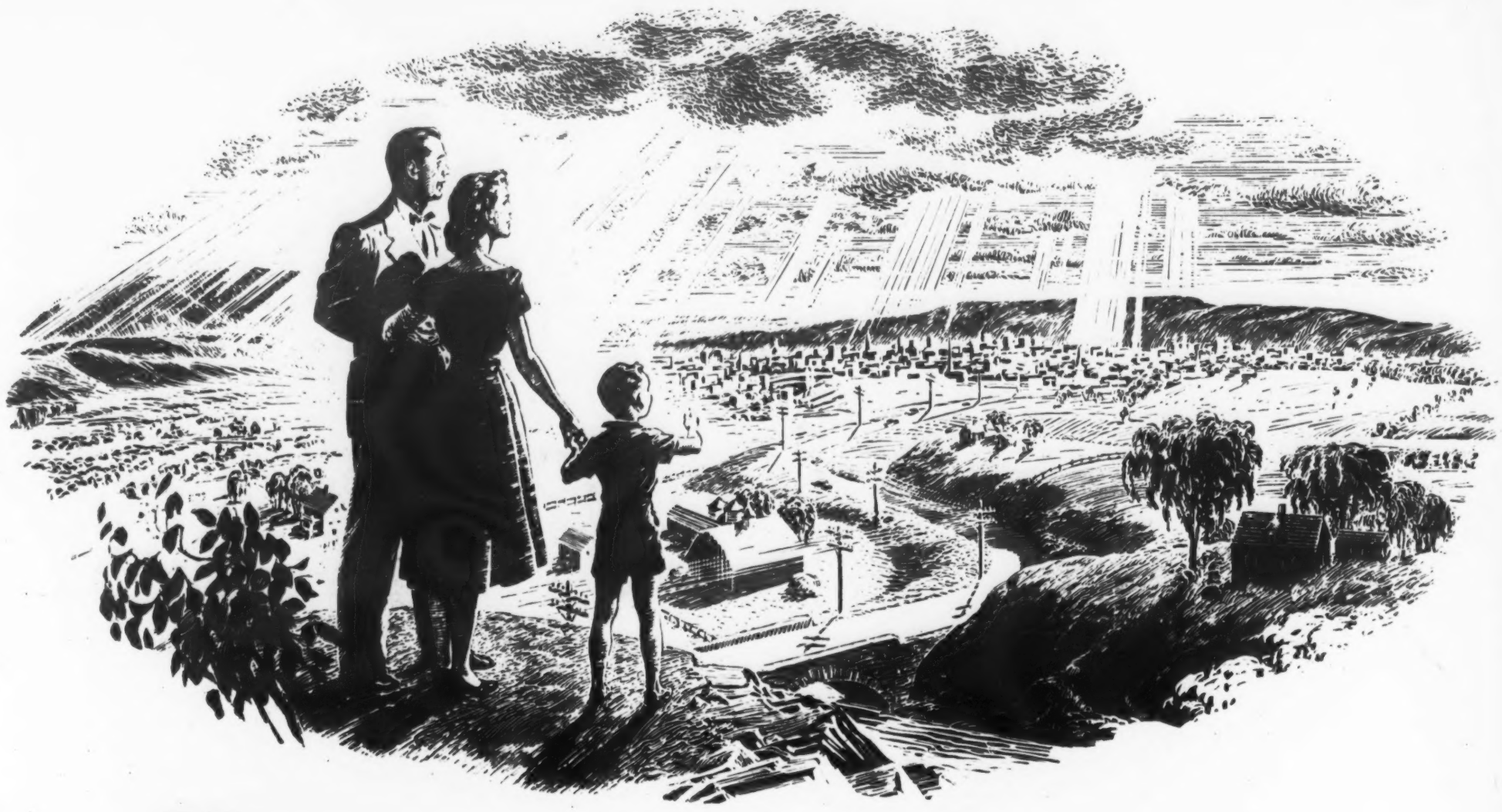

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